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ORIGINAL ARTICLES.

NOTES ON THE REACTIONS AND TESTS OF BILE PIGMENTS IN URINE AND OTHER ORGANIC FLUIDS.

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THE primary pigment-substance of the bile is bilirubin. From it are derived a number of secondary pigments that occur in various fluids of the body, while still others may be produced experimentally. Under the action of certain reagents, probably setting up a process of oxidation, a series of differently colored pigments is formed from bilirubin. Bilirubin, with its characteristic rich amber or brown color, is first transformed into the green biliverdin; this in turn changes into a blue pigment (bilicyanin), followed by a purple red and then, it is said, a yellow substance. Of these pigments, bilirubin and biliverdin are of common occurrence in organic fluids.

The numerous tests recommended for the detection of bile-pigments mostly depend upon this reaction. There are other pigments or pigment-forming substances in the organism that afford red, purple, and other color-reactions with mineral acids; but the distinguishing characteristic of bilirubin is its primary transformation into a green pigment (biliverdin). The essential feature of the ordinary tests for bilirubin is the appearance of an initial green—which may, however, be very transient—under the action of certain reagents. The various processes differ as to the reagents employed (mineral acids and halogen bodies) and the manner of applying them.

The results of a number of observations which I have made as to the effects and relative sensitiveness of various reagents and tests applied to aqueous dilutions of bile, removed after death from the human gall-bladder, appear to be worthy of note. The stronger dilutions of bile (down to about 2 or 3 of bile to 100 of water) are deep brown, and on agitation produce a profuse golden froth. As the dilution becomes more attenuated the brown gradually passes into a rich golden or bright amber. Dilutions of 1–1000 present a well-marked amber color, while in dilutions of 1–10,000 a yellow tinge is still plainly perceptible on looking through a depth of 20 or 30 centimeters of the fluid.

The color-reactions produced by various reagents upon diluted bile are as follows: Pure sulphuric, hydrochloric, or nitric acid, mixed in small proportion with dilutions (five-tenths to two per cent.) of bile, cause a slow change of its color from yellow to green. Several hours may elapse before the change is effected. If the acid be added in larger proportion, the color changes more rapidly, while in very large proportion the green may further change to blue and purple tints. Pure nitric acid is more powerful in effecting the color changes than either sulphuric or hydrochloric acid.

The impure yellow nitric acid of commerce, containing lower oxids of nitrogen, is far more energetic in its action on bilirubin than are the pure mineral acids, and is a very satisfactory reagent for testing purposes. Three or four drops added to about five cubic centimeters of a five-tenths to two-per-cent. dilution of bile, produces a bright green color, immediately or after a short interval; a larger quantity (8 to 15 drops) causes an immediate change to bright grass-green, which soon turns blue, and then purple red. If the fluid be heated, the vigor and rapidity of the reaction are much increased. A mixture of equal parts of pure nitric and hydrochloric acids, prepared immediately before using (the mixture soon turns yellow), was found to produce the color changes in the same manner as does commercial nitric acid, and with equal, or perhaps even greater, energy. Hydrogen peroxid—the commercial article, which contains a small amount of acid—causes a gradual change of color to green.

Very striking reactions were obtained by mixing about five volumes of diluted bile with one volume each of hydrogen peroxid and a strong solution of sodium bromid, and then rapidly mixing with this one-half to one volume of either nitric, hydrochloric, or sulphuric acid. The yellow color of the fluid immediately changes to a green, quickly turning blue and then purple-pink, then more slowly changing to gray, and lastly to yellow. The final yellow does not appear to be due to the bile, but is produced by reactions among the reagents added (perhaps the liberation of bromin). The initial green may pass into the blue so rapidly as to be overlooked if not carefully observed. The changes of color in rapid succession, and their strong contrasts, as in the similar effects producible by commercial nitric or by nitrohydrochloric acid, afford a very striking

reaction. The addition of grape-sugar was not found to affect the reactions in any way.

There are various modes of applying the reagents so as to obtain these color-reactions, as (1) by mixing the fluids intimately, as above indicated; (2) by underlaying the bilirubin-containing fluid with the acid, or (3) by allowing a few drops of each of the fluids to flow together on a white plate.

The color-reactions that occurred on intimately mixing the reagents employed—commercial nitric acid, the nitrohydrochloric acid-mixture, and the mixture of sodium bromid, hydrogen peroxid, and acid—with the fluid were perfectly characteristic and well marked with bile diluted with water as far as the proportion of about 1–200 or 400 (varying with different specimens of bile); below that strength, the reaction became less conspicuous.

The contact method, carried out by underlaying the diluted bile with the acid employed (as in the contact test for albumin), is of equal availability and sensitiveness. At the junction of the two fluids there is usually a colorless layer; above this are layers of reddish purple, blue, and green, from below upward; the green diffuses through the upper fluid, and after a time is replaced by the blue. Below, the acid is pale yellow. In case the sodium bromid and hydrogen peroxid are employed, they may be mixed with the fluid, and the whole then underlaid with the acid. The green layer was distinctly marked in dilutions as low as about 1–200 or 400; below that strength some play of colors was present, but the green color, which is the essential element in testing for bilirubin, became indistinct.

A test very commonly recommended for bile-pigments consists in placing a few drops each of impure nitric acid and the fluid to be tested on a white porcelain dish, and causing them to flow gently together. A play of colors, beginning with green, at the junction of the fluids, indicates the presence of bilirubin. Tests of this method showed it to be sensitive with dilutions of bile to about 1 in 50 or 100; in weaker dilutions a marked play of colors occurs, but no distinct green is present. The methods of mixture or underlaying with the reagent, which are equally easy of application, plainly exhibited the reaction in fluids containing at least one-fourth as much bilirubin, and are therefore about four times as delicate. Moreover, icteric urines occur which give marked response to the mixture or contact-tests, but none distinctly with the plate method. It would seem, therefore, that the white-plate test for bilirubin should be discarded. A number of other methods of carrying out the test, which have been recommended, were briefly tried, but none was found more sensitive or simple than those mentioned above.

Occasions for testing for the presence of bilirubin arise chiefly in connection with the urine. The appearance of urine containing bilirubin is usually almost characteristic. The color is a rich, clear, brownish or bright amber; on its surface a golden froth forms freely on agitation; in consistency, the fluid is perhaps a trifle thicker than usual, and it may impart a yellow color to sediments and precipitates, or to paper moistened with it. Either yellow commercial nitric acid, or a fresh mixture of equal parts of nitric and hydrochloric acids, may be conveniently used to test for bilirubin. If the urine be very dark it may be advisable to dilute it. Three to fifteen drops of the acid may be mixed with five to ten cubic centimeters of the urine to be tested; or the urine may be underlaid with the acid. The presence of unmodified bilirubin is indicated in the former case by the liquid turning a bright or a dark green, either immediately or after a few minutes, perhaps followed subsequently by blue and red colors; in the latter case by the appearance of a green color or layer, above the other colors.

If commercial nitric acid be used in carrying out the common heat-and-nitric-acid test for albumin, the same procedure may serve for both tests, as the hot urine will readily turn green on adding sufficient acid if bile-pigments are present, or the albumin may be precipitated green.

A good arrangement of light for observing the contact-test is to hold the test-tube before white paper, placed at such an angle that the light from the window falls directly upon it, and is thence reflected to the eye of the observer through the fluid.

Other pigments in urine that produce striking red, blue, and other color-reactions with acids, but no green, must be carefully distinguished from bilirubin. Conversely, in order not to interfere with other tests, as for indican, bile-pigments may be precipitated by the addition of lead-acetate solution.

When bile is vomited from the stomach the color of the fluid is frequently or usually green, due to the presence of biliverdin derived from bilirubin by the action of the hydrochloric acid of the gastric juice. On adding the usual acid reagents, the green color becomes blue, the process of oxidation being thus carried a step further.

It occasionally happens that the urine from icteric patients, although presenting the color and other appearances of containing normal bile-pigment, does not respond to the tests of bilirubin. Instead of green, a red or even a blackish color may appear. In these cases the bilirubin has undergone some transformation, perhaps reduction to urobilin, and is incapable of being converted into biliverdin.

THE PRACTICAL VALUE OF THE RÖNTGEN-RAY IN THE ROUTINE WORK OF SURGICAL OFFICE PRACTICE.

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(Continued from page 688.)

An important consideration in connection with skiagraphy in any form is the occasional burning of the patient. At first it seemed impossible that the Röntgen-ray could cause any injury to the skin. The explanation seemed to lie rather in a direct contact with the electrical currents, thrown off either from the tube or from the wires—currents too small, perhaps, to be visible, or to cause any distinct sensation of pain. This theory seems untenable, however, in view of the fact that in some cases of undoubted burning, the Crookes tube has not been held nearer to the skin than eighteen inches. I have used the machinery now some three or four months almost daily, and have had no ill effects in any of my cases. In this community, however, two undoubted cases of injury, following the use of the X-ray, have been observed. One is referred to by Dr. J. C. White in the *Boston Medical and Surgical Journal* of December 3, 1896, page 583. In Dr. White's letter is mentioned a case of "Dermatitis caused by X-rays," published in the *British Medical Journal* of November 7th. Dr. White mentions also a case under the care of Dr Warren at the Massachusetts General Hospital: "A young lady was exposed to the rays for half an hour on one day, and forty-five minutes on the following day, the tube being placed about six inches in front of her sternum. On the following day the skin over this region became red, and later 'blistered.' Three months subsequently, when seen by me at the request of Dr. Warren, early in October, there was an area of angry-looking granulations some three inches square, which had obstinately refused to 'heal.' The surface was very sensitive, and the region was the seat of severe neuralgic pain. It is reported that at the present date, November 15th, two small 'open' spots persist, and that the region is still painful."

I saw this case of Dr. Warren's when it first entered the hospital; some doubt was then expressed as to the source of the irritation. It was thought that minute sparks from the tube might have affected the skin. A much more distressing case has lately been called to my attention, through the courtesy of Dr. Stickney of Beverly.

Dr. Stickney writes:

"The patient, Mrs. Q., came under my care last August, at which time she was suffering from some obscure abdominal trouble. She wished to have the X-ray used on her as a possible means of diagnosis, and with that purpose in view made her arrangements with an expert in skiagraphy, and requested me to be present. The whole abdominal region was exposed to the X-ray, but the force of the ray was focused more to the region of the liver, as that was where she complained of her trouble. There were three exposures made—one of twenty minutes, one of thirty minutes, and the last of thirty-five minutes. The Crookes tube was not brought nearer than eighteen inches to the parts exposed.

"She experienced no discomfort at the time, but some two days after called at my office, complaining that the region exposed to the X-ray felt as though it had been burned by the sun. Upon examination I found the appearance of the parts exposed to be similar to that seen in severe forms of sun-burn. The condition of the parts from this time grew rapidly worse, until a surface some eight inches in diameter had sloughed. The slough was very slow in separating, and the surface has been very slow in filling in, the vitality of the parts seeming to have been affected much deeper than the slough would indicate. All the different treatments for burn and ordinary lesions of like nature have been adopted, together with a thorough curetting, but nothing seems to be of much assistance. The lesion has been very painful from the first.

"At the present time the surface has cicatrized, so that a surface of four inches in diameter is still left unhealed."

It would seem, from the experience derived from these two cases, that the trouble comes from long and continuous exposure.

It is essential, therefore, before subjecting a patient to prolonged examination by the X-ray, to warn him that in rare instances the skin is affected.

CASE X.—A. F., aged nineteen, a football-player, was injured in his left shoulder. There was great tenderness in the outer extremity of the left clavicle. It was impossible, six hours after the injury, to make out crepitus or deformity. A skiagram, taken after an exposure of some six or eight minutes, showed a solution of continuity at the seat of pain. On the strength of the fluoroscopic examination, the arm was put up in a Velpeau bandage. The young man evidently regarded the injury as trivial, for he never appeared again. I was informed, however, by the surgeon of the football-squad, Dr. Balch, that a callus appeared at the point of tenderness a week or more after the injury.

CASE XI.—October 26, 1896: Mr. G., aged fifty-one, four weeks ago began to have pain in the upper jaw. A tumor was conspicuous, through which the X-ray passed without interruption, except from a loose fragment, evidently a sequestrum. Operation

showed an extensive necrosis of the upper jaw, with a loose piece of dead bone, as shown in the skiagram.

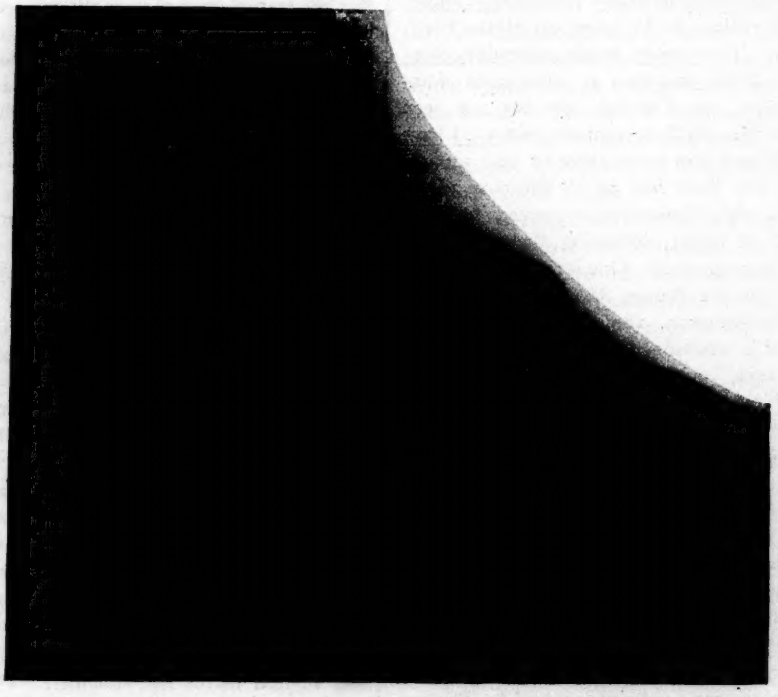
CASE XII.—October 27, 1896. Mr. C., aged fifty-two, a syphilitic with extensive ulcerations over the tibia. By digital examination there seemed to be an increase of bony substance. A skiagram, taken after an exposure of six minutes, showed the tibia perfectly smooth, without loss of contour or increase of bony growth.

CASE XIII.—October 27, 1896. Miss B., a nurse, aged thirty-two, after a septic wound of the middle finger of the right hand, had not been able to straighten the finger for some weeks. The skiagram showed a bony ankylosis.

The distal end of the first metatarsal bone was removed and the great toe brought into the normal line. The man made a rapid recovery. A skiagram, taken a month or two after the operation, showed in an interesting manner the position of the cut surface of the metatarsal bone, with reference to the first phalanx.

CASE XVII.—Doctor ——, aged forty-four, in playing polo had received an injury to the first interphalangeal joint of the middle finger. There was considerable thickening, apparently of bone; yet both fluoroscope and skiagram showed that the bony portions were perfectly healthy. Evidently the case was one of traumatic arthritis without injury to the bone.

FIG. 4.



CASE XX.—Fracture of the Clavicle.

CASE XIV.—October 27, 1896. Judge ——, aged fifty, had received an injury to the left wrist, and feared that the bones had been injured. The fluoroscope showed nothing abnormal. After an exposure of four minutes to a Carbutt plate, a very beautiful demonstration of the bones was obtained, which showed them to be perfectly intact.

CASE XV.—I. F. C., aged forty-two, had an extensive swelling of the right knee, which was shown by the fluoroscope and by the skiagram to involve extensively both tibia and femur. The outline of the diseased parts could be clearly seen.

CASE XVI.—Mr. B., aged fifty-nine, had had for ten years a marked hallux valgus. Examination with the fluoroscope showed the exact position of the bones.

CASE XVIII.—A man of about fifty-seven years received in a planing-machine a severe injury to the right elbow, which required the removal of a portion of the ulna near the elbow. There was marked impairment of function. Examination with the fluoroscope showed no abnormal position of the bones. The skiagram confirmed this. The ankylosis was evidently functional rather than organic, and the man has been put upon massage and passive motion.

CASE XIX.—Mr. D., aged thirty-eight, had a Pott's fracture of the ankle, received from a fall in the street. There was marked eversion of the foot —much more than the position of the fragments would seem to explain. The skiagram shows a fracture of the fibula, with some injury to the internal

malleolus, and a forward displacement of the tibia. No bony injury to the tibia could be made out. The patient was sent to Dr. Goldthwait who applied a steel support.

CASE XX.—A man of thirty-two, in September, 1896, fell from his bicycle and received an injury to the left shoulder. He was treated in a hospital. I first saw him two months after the injury. Nothing abnormal could be detected on inspection. Careful digital examination revealed a slight deformity of the left clavicle. There had evidently been some kind of fracture, but the result was extremely good. The skiagram (Fig. 4) shows excessive displacement of the fragments. Such a skiagram as this would certainly indicate to the lay mind a deplorable lack of skill. The surgeon knows, of course, that such results cannot be prevented, especially in the clavicle.

CASE XXI.—Mr. X., aged thirty-four, shot himself through the thorax with a thirty-two caliber revolver, in November, 1893. The wound of entrance was two inches above and to the right of the left nipple. It was hard to see why the bullet had not penetrated the heart. Complete and lasting recovery followed. In September, 1896, in examining with the fluoroscope, I could see the bullet distinctly in the left and posterior part of the thorax under the ninth rib. After an exposure of thirty minutes a faint skiagram of the ribs, scapula and bullet was produced. No operation was performed, as the missile was causing no trouble.

CASE XXII.—Mrs. B., aged sixty-six, has had for years severe rheumatic arthritis in the fingers of the right hand. An exposure of forty seconds gives an excellent idea of the osseous deposit.

Besides the foregoing cases, I have used the fluoroscope in many others—cases in which negative results were of great service to me in forming an opinion, such as demonstrations of the absence of fractures and dislocations, bony ankyloses and tumors. The usefulness of the apparatus is quite as conspicuous in cases of this kind as in those in which a foreign body or a bony deformity is present.

The medico-legal aspects of this subject, though at present uncertain, add strong arguments in favor of routine office skiagraphy. In fractures it is of the greatest importance for the physician's own protection that he should ascertain by the use of the fluoroscope the exact situation of the fragments, even if he has already an accurate idea of their position and shape, for if he does not recognize, even if he cannot correct, a faulty approximation, the deformity is pretty sure, sooner or later, to be detected by a complaining patient. It is only a question of time, I think, when every person who has had a fracture will try to have it photographed by the X-ray. It will then appear, as we all know, that in many instances the bones are not in perfect approximation. Indeed, fragments which have been brought together with the greatest care by the most skilled operators will often show, under X-ray photography, a reduction which, to the patient, appears unskillful. I recall one case in which one of the most eminent surgeons in this country reduced a fracture of both bones of the forearm. Though the position was absolutely perfect, as far as could be judged by any of the ordinary methods of investigation, an X-ray photograph showed that the fragments of the ulna were considerably displaced (see Case 1). The ultimate practical result was most excellent. The imperfect approximation would never have been suspected by ordinary methods of examination. Indeed, it is doubtful whether the fragments could have been better adjusted by the aid of the fluoroscope. Nevertheless, it seems to me, the use of the X-ray is demanded in all cases, for some fractures are sure to be followed by an impairment of function. Unless, therefore, the surgeon can show that he has used every means at his command to understand and treat the fracture (and these remarks apply also to dislocations), his defense in case of legal complications—always liable to arise—must, of necessity, be weakened.

The present aspect of the subject before the courts seems of interest in connection with a physician's responsibility in the case of fractures. I have been recently informed by an experienced trial judge of this Commonwealth that "It is the opinion of some of the judges of Massachusetts that X-ray photographs are not admissible as evidence. One judge holds that it has not been demonstrated as a scientific fact that they are accurate. The process has not become such a matter of common knowledge that the courts will take judicial notice of it. No man can tell by ocular or other sensory evidence that the reproduction is accurate. The truthfulness of the photograph is a matter of reasoning." Other judges do not take this view; they say that there is no reason why an X-ray photograph cannot be substantiated by reasoning from well-known anatomical facts—reasoning which excludes the mistakes and distortions of ordinary photography; that the courts have always received evidence which, by its very nature, must render valuable assistance in investigations; that, moreover, this evidence has not always been confined to that dependent upon the ordinary senses—a form analogous to the ordinary expert evidence; and, furthermore, that the rule of law has allowed not only evidence derived from the use of the five senses, but has also permitted the introduction of evidence derived from the reasoning power, as in the ordinary expert evidence, and the evidence as to customs, and the like. The crucial test will come when an actual case presents itself to the courts with all the side lights of fact and circumstance.

CLINICAL MEMORANDUM.

A CASE OF TUBAL PREGNANCY SIMULATING APPENDICITIS.

BY WM. T. LUSK, M.D.,
OF NEW YORK.

ON the 4th of November last, I was invited by a physician of this city to see with him a young woman, twenty-two years of age, who presented many of the symptoms of appendicitis. Her general health had in the main been good, but six months previously she had been suddenly seized with intense pain of sharp, lancinating character, in the right inguinal region. It persisted for three or four days, during which time the bowels were costive and vomiting was frequent. It then passed away, and except for occasional shooting pains in the right groin, the patient remained well until five days before my visit, when she had a second attack, likewise attended by vomiting and constipation. The pain, which had at first been general, was localized, and the tenderness upon pressure was apparently greatest at McBurney's point. The temperature was 100⅘° F., pulse 96, respiration 20, and there was retention of urine. The evidences of appendicitis seemed to be complete. I was, however, asked to make a vaginal examination. On the right of

the uterus I found a swelling the size of a large orange, which contained fluid, and was firmly fixed in the pelvic cavity. I suggested, therefore, that the patient should be removed to Bellevue Hospital for further consultation, and for operation, should the latter be decided to be necessary.

On her arrival at the hospital on November 5th, the temperature was 100.8° F., pulse 112, respiration 28. The case excited a great deal of interest on the part of the house staff, and of the consultants invited to the examination. It was thought that the skilled finger could detect the thickened appendix. As, however, the theory of appendicitis did not satisfactorily account for the pelvic tumor, I decided upon an exploratory incision in the median line. When the examining finger was introduced through the abdominal opening, it was easy to determine that the appendix was normal, and that no adhesion nor inflammatory condition existed in the vicinity of the cecum. The apparent enlargement of the appendix had disappeared. Below the pelvic brim, a sac with thin, tense walls was felt to the right of the uterus. It completely filled the right pelvic space. Fearing that the sac-contents might prove to be purulent in character, and feeling certain that manipulation would insure its rupture, I aspirated a portion of the fluid from below through the vagina. It proved to be clear and slightly tinged with blood. The removal of about an ounce was followed by the shrinking of the sac, and by the perceptible thickening of the sac-walls. It was then detached and ligated off without special difficulty. It proved to be a tubal pregnancy. The ovum had grown downward between the folds of the broad ligament. The embryo had probably perished in the early weeks, though there remained sufficient decidual and chorionic tissue to establish the character of the sac.

The patient made a rapid recovery, and returned home at the end of three weeks.

The case is interesting because of the question it raises as to whether a positive diagnosis of appendicitis can be made in all cases. Of course, there is no other department of abdominal surgery in which complete immunity against diagnostic error has been affirmed.

MEDICAL PROGRESS.

An Unusual Case of Lockjaw.—SACHSE reported in the *Centralbl. f. Chir.*, No. 40, 1896, an unusual case of lockjaw occurring without known cause in a male, aged twenty-four years. On waking one morning he found he could not open his mouth as far as usual. The disability increased daily, until he was unable to separate the teeth. For four years he was treated without benefit, until it was discovered that the right upper wisdom-tooth pointed directly outward, and so pressed against the internal pterygoid muscle as to prevent the jaw from opening. It was removed with difficulty. Immediately after its extraction the jaw could be partially opened, and in eight weeks function was fully restored.

Thirteen Operations for Recurrent Sarcoma.—In the *Lancet*, November 7, 1896, ELIOT gives the history of a series of thirteen operations performed by him upon a patient, seventy-five years of age, for myxo-sarcoma of the right scapula. The first operation was performed in September, 1892, the patient then being seventy-one years old. The growth recurred in a year, and was again and again removed, at intervals of from one to six months. In May, 1895, the arm was removed, together with the outer third of the clavicle, and what remained of the scapula. The patient made a good recovery, and four months later there was no evidence of recurrence. Eliot is convinced that although the disease recurred and caused the patient's death the removal of the whole extremity was nevertheless advisable, as the extension of the growth into the axilla was causing the patient great pain.

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IMMUNITY FROM TYPHOID FEVER OBTAINED BY INOCULATIONS.

PEIFFER and KOLLE have been conducting at Koch's Institute in Berlin a series of experiments with cultures of typhoid bacilli, and have obtained valuable results, some of which are outlined in an article in the *Deutsche med. Woch.*, November 12, 1896. Those who have kept in touch with the discoveries made in connection with the subject of immunity, know that protective inoculation against cholera has been conducted in India on a tremendous scale. In 1895, over 100,000 persons were inoculated, first with a small dose of a sterilized culture of cholera germs, then five days later with the same dose of a living culture, and five days after that with a final larger dose of the living culture. The results were definite, and not entirely unexpected. The inoculated individuals, when compared with others in similar circumstances who were not inoculated, were found to possess to a considerable degree an immunity from cholera.

Experimental research has yielded similar testimony. Thus it is found that 0.5 c.cm. of *normal* human serum is sufficient to save a guinea-pig from death if it is injected simultaneously with a loop full of cholera cultures into the animal's abdomen; a single milligram—indeed in some cases only a fraction of a milligram—of the serum of a *cholera-inoculated* man will avert death if injected in the same way. This specific result with such a minute dose can only be obtained by using the serum of either a person who has recovered from cholera, or, as already said, of one who has been inoculated with cholera cultures.

These results were so definite that Peiffer and Kolle resolved to test the typhoid bacillus in the same way, using for the purpose a most virulent culture obtained from the spleen. A small quantity of this was diluted with bouillon, sterilized, and injected under the skin of a man who had never had typhoid fever. The injection was followed by a chill, dizziness, and a temperature of 38.5° C.—101.3° F. These symptoms disappeared entirely in one day. The serum from the man so treated was drawn before inoculation, and six and eleven days after the inoculation, and used for experiments upon guinea-pigs. The results were found to be analogous to those obtained with cholera germs. At six days the serum showed its power of saving a guinea-pig, if injected into the abdomen with an otherwise fatal dose of typhoid culture. By the eleventh day this immunizing power was still stronger, being then at least as strong as that of the serum of a convalescent typhoid patient.

In the light of our present knowledge it seems that the freedom from second attacks, enjoyed by patients who have recovered from typhoid and certain other fevers, is due to the appearance in the blood of some specific germicidal substances. Their presence insures for a certain time—for months or years it may be—immunity from that particular disease which has produced them. If these artificial inoculations produce in the individual a serum of germicidal power equal to that of a convalescent patient, why will they not confer immunity against typhoid fever just as well as a previous attack of the disease? These investigators believe that this is so, and look for a practical application of the theory in some rapidly spreading epidemic.

It will be noticed that this is quite a different thing from the inoculation of a man already sick. The system in the latter case is already poisoned and reacts very differently to the injection of the serum. As in cholera so with typhoid; this antitoxic serum pos-

sesses a germicidal power, but does not seem to have any counteracting influence upon the toxic products of the typhoid bacilli. In this sense it is not an antitoxin.

THE TREATMENT OF TUBERCULOUS DISEASE OF THE KNEE-JOINT IN CHILDREN.

A MOST important contribution to the knowledge of the pathology of tuberculous disease of the knee-joint and of the final results of its treatment is presented in the recent report of the cases treated under the direction of Professor Koenig in the hospital at Göttingen during the eighteen years from 1875 to 1893, entitled "Die specielle Tuberculose der Knochen und Gelenke." Koenig calls attention to the fact that there has recently been a general abandonment of the operative in favor of orthopedic treatment, and states that, in his opinion, the reaction has been too great; for while it is true that an ideal result, the cure of disease and the preservation of function, can only be attained by conservative treatment, yet this is possible in but a small percentage of the cases, and that the radical removal of disease offers the only approximately sure method of cure, and is, on the whole, the safest treatment. Although Koenig does not admit the marked distinction, either in the pathology or behavior of tuberculous disease of the adult and the child, that has been claimed by others, yet for economic reasons, and because operative treatment does not offer the same assurance of permanent cure, conservative methods should receive in childhood a thorough trial before radical measures are resorted to. In answer to a possible criticism that more favorable results might have been presented by one who had operated less often, he asserts that no radical operation had been performed until he was assured that recovery with retention of joint function was impossible.

Of the 720 patients admitted to the hospital for the treatment of tuberculous disease of the knee-joint, 323 were children. Of these, 218 were either primarily or secondarily treated by radical operation: by arthrectomy, 128; by resection, 82; by amputation, 8. Simple conservative treatment was attempted in 128 cases, 83 children and 45 adults. In 117 of these, the final results are known; in 52 the treatment had been abandoned; in 49 (40 children and 9 adults) the results are classed as good, although of these but 14 recovered with a movable joint, and of the remainder the leg was deformed in one-half. Other cases (53 children) were treated by injections of iodoform-glycerin, by atypical operations, and the like, but it is impossible to separate the results from the larger number of adults similarly treated.

This proportion of operations on children shows either an advanced stage of disease or deformity, or else a tendency on the part of the surgeon toward radical treatment, while the results in the non-operative cases are bad enough to warrant the conclusions that have been drawn from them. On the other hand, the report shows that effective orthopedic treatment was lacking, except during the period of hospital residence; Koenig does not use apparatus because it is ineffective, and because of its expense; consequently all the protection that the joint received during the greater part of the treatment was that afforded by plaster-bandages applied at infrequent intervals.

It may be of interest in this connection to compare these statistics with those reported by Gibney (Transactions of the New York Academy of Medicine, vol. ix, 1893), showing the final results in 300 cases of tuberculous disease of the knee in children, treated during a similar period of twenty years at the Hospital for Ruptured and Crippled and elsewhere, by what may be termed, by comparison, ultraconservative methods. Radical operations were performed in but 16 instances, as contrasted with 218 in Koenig's list. In sixty-three per cent. of all those on whom conservative treatment was begun, it was continued to the end, and the patients were cured, as contrasted with fifty per cent. of Koenig's selected cases. Of 242 living patients, including those still under treatment, seventy-nine per cent. retained motion in some degree, thirty-eight per cent. of these from a range of 45° to normal. In a smaller group, treated by modern protective methods, motion was retained in ninety-five per cent. Although suppuration had at some time been present in nearly half of the cases, the death-rate from all causes was but 13.3 per cent.

In this country the orthopedic treatment of chronic joint-disease long antedated the knowledge of its cause, and this treatment, supported by the study of its effect upon the symptoms of the disease, and of

the functional results attained by it, has been modified rather than displaced by the better understanding of its exact pathology. Consequently, the patients have been spared in great degree the unnecessary and mutilating operations that were at one time in favor elsewhere.

The ideal result, as it is styled by Koenig, the cure of local disease and the preservation of function, at least in part, is not in childhood considered a remote possibility, but as a result that may be attained in a large proportion of cases treated under proper conditions. It is a result made probable by long-continued and effective protection of the diseased joint. Such protection must include the removal of superincumbent weight, and the cessation of joint function by fixation as complete as possible. Deformity, if present, must be rectified, and must never be allowed to recur. To this fundamental and essential protection all other surgical treatment is secondary, and it is believed that only when combined with such protection can the relative value of antituberculous injection or the method of passive congestion, or the minor operative procedures be ascertained, or the necessity or advisability of radical operations be properly estimated. For, while pathology, as Koenig insists, must be the basis of treatment, yet the condition of a joint revealed at operation depends in great degree upon the quality of the patient and upon the treatment that has preceded the operation. It may be true that there is no essential difference in the disease of the adult and the child, yet early excision is often the treatment of choice and necessity in the former, because practical experience has proved, aside from the economic question involved, that conservative treatment is more difficult, that the course of the disease is longer and more depressing, and that the outcome, both as regards mortality and functional results, is much less favorable than in childhood.

It is very evident that Koenig's conclusions cannot be accepted as applying to the treatment of knee-joint disease in this country. The great value of his work will be rather in the opportunity that it affords for the study of the intimate nature of the local tuberculous process, from its inception to its end.

Finally, we may conclude that the best statistics will be furnished by those patients on whom effective protective treatment has been early applied, and persistently and faithfully continued. This treatment must, from the nature and duration of the disease, be in a great degree ambulatory, and therefore orthopedic in character, and it is only in conjunction with such treatment that the advances toward the more rapid cure of disease, whether by operation or by any form of local medication, will be made.

ROYAL WHITMAN, M.D.

ECHOES AND NEWS.

Death of a Kansas Physician.—Dr. Selden W. Jones, one of the oldest practising physicians in Kansas, died at Leavenworth last week.

Resignation of Dr. Lloyd.—Dr. Samuel Lloyd has severed his connection with the editorial staff of the *American Medico-Surgical Bulletin.*

Changes in Parke, Davis & Co.—Mr. George S. Davis has withdrawn from the corporation of Parke, Davis & Co., the well-known manufacturing chemists, whose headquarters are at Detroit, Mich.

An American Physician Dead in Chili.—Dr. James H. Trumbell, formerly of New Haven, Conn., died recently at Iquique, Chili. He was graduated from Yale College with the class of 1848, and from the College of Physicians and Surgeons, New York, in 1852. He had resided at Talcahuano and Concepcion, Chili, for more than forty years.

Assault upon the Author of "Ben Bolt."—Dr. Thomas Dunn English, one of the oldest living graduates of the medical department of the University of Pennsylvania, and the famous author of "Ben Bolt," was assaulted by a tramp at his home in Newark, N. J., recently, but escaped without serious injury. His assailant was taken into custody after a lively chase, and was held for trial.

Bees to make Medicated Honey.—According to a Paris journal a Frenchman has been trying to compel bees to make medicated honey. He keeps the bees under glass and gives them only flowers that have the desired properties. Thus he obtains different kinds of honey by which influenza, coughs and colds, indigestion, asthma, and many other ills are said to be readily if indirectly reached.

An Interesting Lecture at Bellevue.—Dr. T. M. Rotch of Boston, lectured by invitation before the students of Bellevue Hospital Medical College on December 15th, last, on the Differential Diagnosis in the Eruptive Diseases of Children, with special reference to scarlet fever and its complications. The lecture was illustrated with colored lantern slides, and was exceedingly instructive and interesting.

"The Devil's Club."—There recently arrived in Portland, Ore., a miner from Alaska in search of surgical aid. His face and hands were filled with the poisonous barbs of a plant known as the creeping devil's club, *Panax horridus.*

The unfortunate man presented an appearance resembling the most aggravated erysipelas, and gave evidence of constitutional infection. Free incisions were often necessary to extract the thorns which incline to sink deeper and deeper into the tissues. Contact with this vine is one of the accidents of Alaskan travel most dreaded by prospectors.

Aiken Cottage Sanitarium.—Dr. C. F. McGahan has recently opened a Cottage Sanitarium at Aiken, S. C., for men only, who are suffering from the first stage of pulmonary phthisis. The work is modeled on philanthropic lines, a nominal weekly charge being made in order to exclude the pauper class, who are provided for elsewhere. The only similar institutions of this kind in this country are those conducted by Dr. Trudeau, at Saranac Lake, in the Adirondacks, Dr. Bowdich, at Sharon, Mass., and the Loomis Sanitarium, Sullivan County, N. Y.

Malignant Anthrax at Sing Sing Prison.—A convict in Sing Sing prison has recently developed a case of malignant anthrax, the result of scratching a pimple on his neck with his finger nails. He had been handling curled hair, such as is used in upholstery work, and it is supposed that the anthrax spores had collected under the nails. He has had violent hemorrhages from the nose and mouth, and his left side is completely paralyzed, but Dr. R. T. Irvine, the prison physician, thinks his chances of recovery are good. It is said that only about a dozen cases of this disease in man have heretofore been reported as occurring in this state.

The American Medico-Surgical Bulletin, beginning with the New Year, will be issued as a semi-monthly, with Dr. R. G. Eccles of Brooklyn, in editorial charge. The annual subscription has been reduced from four dollars to one dollar, and the policy of the publication will be upon radically different lines from those heretofore pursued by its retiring editors. It would appear to the interested inside observer that the "brilliant editorials, straight from the shoulder, written without fear or favor," and the greatly extolled "campaign against medical humbugs of every kind" in which other journals were invited to follow the *Bulletin's* lead to a glorious medical Arcady, has not been attended by the scintillating success that the projectors anticipated.

CORRESPONDENCE.

THE MEDICAL NEWS ANTITOXIN INVESTIGATION.

To the Editor of THE MEDICAL NEWS.

DEAR SIR: I desire to offer my very earnest commendation on the investigations undertaken by the MEDICAL NEWS to determine the strength of the different preparations of diphtheria antitoxin that are now on sale in different parts of this country.

It would seem almost unnecessary to direct attention to the fact that the value of a preparation of antitoxic serum depends not upon the bulk of the serum, but upon the antitoxin contents; and yet this matter of supreme importance in determining the efficacy of diphtheria antitoxic serum has received comparatively little attention outside of France and Germany, where the tests are under governmental control. In Great Britain, until within a few months, it was unusual for preparations of serum to bear any statement of their strength in antitoxin. They were simply labeled diphtheria antitoxin, or antitoxic serum, dose 10, 20, or 30 c.c., as the case might be.

The investigations of the special commission of the London *Lancet*, made during the recent summer, showed conclusively that many of the preparations in use in England were entirely inefficient, or almost without value. I had occasion at that time to direct a communication to the editor of the *Lancet*, calling attention to the action of the New York Health Department in December, 1894, regulating the sale of this agent in this city. On December 26th, 1894, a communication by Dr. T. Mitchell Prudden and the writer was addressed to the New York City Board of Health recommending "that the Board take such action as may be required to prohibit the sale or exposure for sale in this city of any preparation of this remedy in which the vial containing it does not bear a label giving the value in antitoxin of the contents, as measured by some recognized standard." As the result of this recommendation the Health Board adopted an amendment to the Sanitary Code on January 9th, 1895, reading as follows:—"Sec. 220—That no preparation of diphtheria antitoxin shall be offered or exposed for sale in this city unless the receptacle containing such preparation bear a label on which is placed the name and the address of the producer, and upon such label, or upon a circular accompanying such receptacle and enclosed with it in a sealed package, shall be printed or written the date of production and the value of the contents in antitoxin, as measured by some generally recognized standard."

At the time that this action was taken there were already on sale in this city two or three preparations of so-called antitoxic serum, which contained absolutely no antitoxin and these preparations were being sold at $5 to $10 a vial. The action of the Board taken at the very beginning of the work in this country resulted in the immediate disappearance of all the absolutely spurious preparations from this city, and had, I believe, a most beneficial influence throughout the country, in causing the various producers of antitoxin to label their preparations in such form as make possible the exact determination of their antitoxin contents. Unfortunately, however, the systematic testing of such preparations cannot well be placed under govermental control in this country, and the public and profession are somewhat at the mercy of the producers.

The Massachusetts State Board of Health has undertaken from time to time to make and publish reports of tests of preparations of antitoxin on sale in Massachusetts, and the Pennsylvania State Board of Health has taken similar action. The New York City Health Department has, also, from time to time tested preparations of anti-

toxin on sale in this city, and where preparations were below the standard marked on the label have notified producers of the fact and warned them to withdraw such preparations from sale in the future.

The action of such a representative journal as the MEDICAL NEWS, in undertaking to make tests of all the preparations largely in use in this country, will have a most salutary influence upon the character of the serum which is being produced. All of the reputable producers, who are anxious to send out serum only of the best quality—of which I am glad to say there are a number in this country—will gladly welcome such investigations, and those who are not reputable, will be forced to discontinue the production of serums of poor quality.

Of course it is not possible to determine with absolute chemical accuracy the strength of preparations of diphtheria antitoxin, and of course it is understood that there is some loss in antitoxic power with time; but the approximate determination of the value of any preparation is simple, well understood, and sufficiently accurate for the purpose required.

Sincerely yours,

HERMANN M. BIGGS.

NEW YORK, December 22, 1896.

THE MEDICAL NEWS ANTITOXIN INVESTIGATION.

To the Editor of THE MEDICAL NEWS.

DEAR SIR: Your report of the experimental investigation into the strength of the different preparations of antitoxin sold in this country is interesting and instructive reading. The medical profession is certainly under great obligation to the NEWS for taking up this question, and I sincerely hope that you are not going to let the matter drop. You have started on a good work; by all means continue it.

I think you are right in saying that what the profession wants is not antitoxin which can be furnished for a low price, but one which is absolutely reliable and that the profession and the public are willing to pay whatever it will cost to produce such an article.

Very truly yours,

L. EMMETT HOLT.

NEW YORK, December 19, 1896.

OUR PHILADELPHIA LETTER.

[From our Special Correspondent.]

MEETING OF THE PATHOLOGICAL SOCIETY.—DR. SKENE OF BROOKLYN READS A PAPER BEFORE THE GYNECOLOGICAL SECTION OF THE COLLEGE OF PHYSICIANS.—MEDICAL DINNERS AND FESTIVITIES, ETC.

PHILADELPHIA, December 19, 1896.

AT the last meeting of the Pathological Society, the specimens presented were so exceptionally interesting that it is a difficult matter to discriminate between them. Dr. H. W. Cattell brought forward a new and rapid method for the preparation of frozen sections, by methyl and ethyl chlorid. The specimen to be cut is prepared as usual and placed on a cork and a stream from a reservoir containing a combination of these drugs, known as anestile, is allowed to play on it from thirty seconds to a minute. As soon as crystals of ice are seen forming on the specimen, it is found to be firmly adherent to the cork, ready for use, and can be cut into sections as desired. The simplicity of the method, together with its rapid action and comparatively small cost, should soon gain a place for it in popular favor.

Dr. J. P. Arnold presented the kidneys from a case of primary interstitial nephritis without arterial change, in a young man. The etiological factor in this case seemed to be the point of especial interest. The kidneys were almost entirely devoid of secreting substance. The interstitial structure being in great preponderance. The usual factors in the production of such a condition were eliminated by the history of the case, the final solution suggested by Dr. Arnold being, that the condition was a congenital one finding its analogy, for instance, in the condition of the thyroid gland in some cases of cretinism. Dr. F. A. Packard reviewed a case of aneurism of the abdominal aorta, showing the specimen and dwelling particularly upon the fact that it had ruptured into the pleural cavity, a very rare occurrence in aneurisms in the locality mentioned. Among other specimens exhibited was one of perforating tuberculous ulcers of the intestine, by Dr. S. Solis-Cohen, who regarded the perforation of the bowel in such cases as a very rare complication of the disease.

At a recent meeting of the Gynecological Section of the College of Physicians Dr. Alexander J. C. Skene read a very able and interesting paper on the diagnosis and treatment of disease of the pelvic viscera in women. Drs. Baldy, Noble, and Howard Kelly discussed it in their usually skilful manner. After the meeting Dr. Skene and the other guests of the evening were tendered a reception at the University Club.

During the last few weeks there have been accounts in the secular press of the investigations ordered by Judge Gordon as to the detention of prisoners presumably insane in the Eastern Penitentiary in this city. The investigation is now being made by the grand jury, and some light may be thrown on the comparative influence and worth of the cellular or solitary confinement system as against the aggregate or commingling method.

This is the season for the interchange of social amenities over the festive board, and numerous have been the banquets and entertainments within the past few weeks. Notable among them was the dinner given to Honorable William Potter, the recently elected President of the Board of Trustees of Jefferson Medical College. Dr. A. K. Minich presided in his own inimitable manner, and toasts were ably and eloquently responded to by Judge S. Gustine Thomson, William Singerly, Esq., Drs. S. Weir Mitchell, J. Chalmers Da Costa, and W. M. L. Coplin. The fiftieth anniversary of the Northern Medical Society of this city was celebrated by a banquet at the Hotel Walton. Dr. Richard H. Townsend, the only one of the charter members of the organization still living, was unable to be present and sent a letter of regret which was read at the meeting.

SPECIAL ARTICLE.

THE USE OF ANTITOXIC SERUM IN THE TREATMENT OF DIPHTHERIA UNDER THE SUPERVISION OF THE NEW YORK CITY HEALTH DEPARTMENT, WITH A RESUME OF THE PUBLISHED REPORTS ON THIS SUBJECT.

By HERMANN M. BIGGS, M.D.,
of New York;
Pathologist and Director of the Bacteriological Laboratories, New York Health Department,
and
ARTHUR R. GUERARD, M.D.,
of New York;
Assistant Bacteriologist.

(Continued from page 715.)

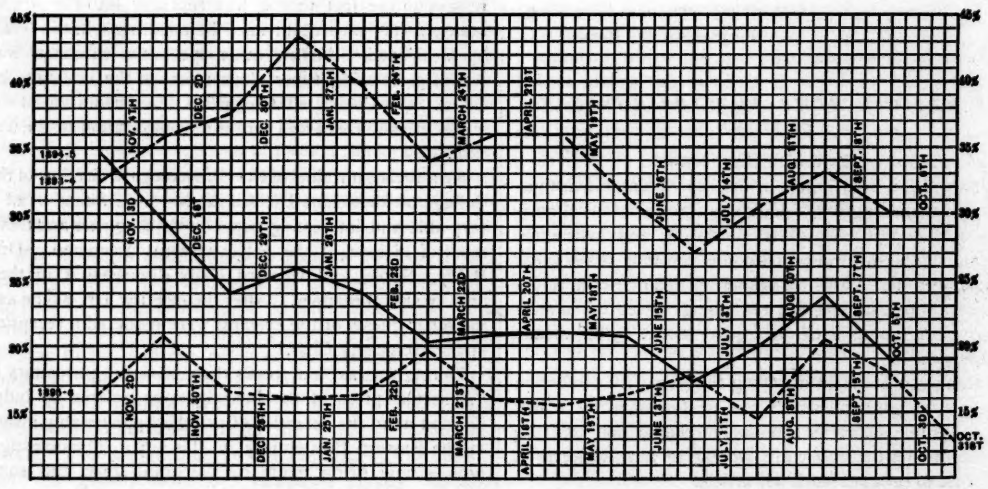
Before considering these figures, and those in other tables relating to New York, it should be stated that antitoxin was first introduced to a very limited extent from abroad in November, 1894. In January, 1895, the distribution and use of the antitoxin produced by the New York Health Department was begun, the amounts used and distributed, of both the foreign and domestic products, increasing gradually until the fall, when a very rapid expansion in the use of antitoxin took place, as indicated by the large increase in its sale, its free distribution to the physicians of the city, and its free administration by the medical inspectors of this Department.

Proceeding now to the consideration of the figures in table 8, we note that the percentage of mortality from diphtheria and croup in 1895 (19.1 per cent.) is much lower than that for any previous year, even when compared with the percentage of mortality from *diphtheria alone*. The lowest rate prior to 1895 is that for 1889, 25.9 per cent., which, for reasons previously given, is certainly too low. It is also to be noted that the decrease in mortality from 1894 to 1895 is considerable, amounting to over thirty-five per cent. of the rate for 1894. In the sixteen years for which the figures are given, the greatest previous increase or decrease in case fatality for any year as compared with that preceding it, is in 1887, when the decrease amounted to twenty-five per cent. of the rate for 1886, or twelve per cent. less than the percentage decrease, 1894 to 1895. But in this year (1887) the decrease in death-rate is accompanied by an increase of 361 in the number of deaths, while in 1895 there is a decrease of 894 in the absolute mortality as compared with that of 1894. This large actual and relative decrease in case fatality in 1895 points to the introduction in this year of some previously non-existent factor.

Proceeding next to a comparison of total cases with total deaths, there is indicated an apparent tendency toward correspondence of deaths and cases as to increase or decrease. To this there are several exceptions, as will be seen by an examination of the figures. From 1890 to 1894, however, with the exception of a small decrease in the number of cases in 1892 as compared with the previous year, there is a steady and rapid increase in both cases and deaths until 1895, when this correspondence is abruptly destroyed, a very large decrease in deaths taking place, while the number of cases is increased by 712, making the total of cases for 1895 the largest ever recorded in the city. The introduction of some disturbing factor, previously non-existent, is thus again strongly indicated.

Chart No. 1 [1] gives the case fatality from diphtheria and croup in New York for periods of four weeks, the figures for

Chart No. 1.



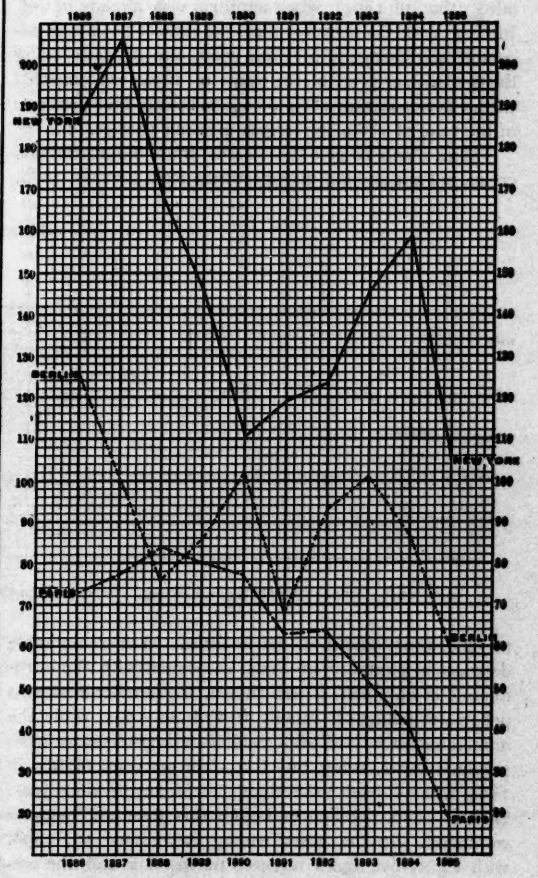
New York. Diphtheria and Croup. Case fatality, periods of four weeks. November, 1893, to October, 1896.

[1] The tables containing the data from which this and subsequent charts presented have been constructed, are omitted for the sake of brevity.

cases and deaths on which it is based being taken from the weekly reports of the Health Department. The method of bacteriological examination in the diagnosis of diphtheria was inaugurated by the Department in May, 1893, and by the autumn of that year had been very generally adopted by the medical profession, and entirely so by this Department through its medical inspectors, as an efficient adjunct to clinical diagnosis. It has been claimed that a considerable increase in reported cases of mild diphtheria, with a consequent decrease in case fatality, results from the extended use of bacteriological examinations in this disease. This claim is not substantiated by a careful comparison, recently made in this office, of the clinical diagnosis with the results of bacteriological examination in cases of suspected diphtheria; but supposing it to be true, any variation in case fatality so produced would in all probability have been relatively the same in the period selected for comparison, previous to the introduction of antitoxin (*i. e.*, November, 1893, to November, 1894), as in the corresponding periods after its use had been begun. The influence of this factor may therefore be almost entirely disregarded. Considering the chart we note, in the year previous to the introduction of antitoxin, an increase of case fatality from 32.3 per cent. in November to a maximum of 43.3 per cent. in January, followed by a decrease to a minimum of 27.1 per cent. in July. With the exception of a slight decrease in October, 1894, the case fatality increases from July to November. At this point, coincident with the introduction of antitoxin, a decrease begins, continuing steadily, with the exception of a slight rise in January, to March, 1895. This is in sharp contrast with the figures for the corresponding period of the previous year. From March to June, 1895, the rate remains practically constant, declining to a minimum of 17.2 per cent. in July. The usual seasonal increase in case fatality then begins, but in October, at which period began the rapid extension in the use of antitoxin previously noted, a decrease begins, which, with the exception of comparatively small increases in November, 1895, and March, 1896, and a somewhat marked rise in August, 1896, has continued to date of writing (November, 1896). The case fatality for October (12.8 per cent.) is the lowest ever recorded for a corresponding period in New York. The rise in August (from 14.4 per cent. for July to 20.6 per cent.) is undoubtedly due, in large measure, to the protracted period of extreme heat, which occurred in the early part of this month, and which produced the highest general mortality recorded in this city for many years. It is interesting to note that the usual seasonal decrease in actual cases and deaths during the late summer and early autumn, followed by an increase on the advent of colder weather, and the opening of the public schools, occurred both before and after the introduction of antitoxin, being apparently uninfluenced by this, and bearing, as a rule, no direct relation to the changes in case fatality recorded.

Chart No. 2 gives the case fatality in diphtheria and croup for periods of four weeks in New York and Paris, and for diphtheria only (croup not separately reported) in Berlin. Cases of croup are not separately reported in the statistics of the latter city. The figures for cases and deaths are taken from weekly reports of the three cities, and for New York correspond with those presented in a portion of chart No. 1. In Paris, antitoxin was in general use in January, 1895, the beginning of the period tabulated, and was largely used in Berlin, while in New York it had just been introduced. The gradual approximation of the case fatality in New York to that in Paris and Berlin is well shown in the chart, and coincides with the increasing use of antitoxin in the former city. In Berlin, climatic influences appear to have but little, if any, effect in increasing or diminishing the number of actual cases and deaths. The effect on case fatality is, however, more apparent, as the lowest rate for 1895 (12.1 per cent.) occurs in July. In Paris, the seasonal variations coincide quite closely with those in New York for 1894, the lowest case fatality and smallest number of deaths occurring in July, and the smallest number of cases in October. The remarkably low case fatality in Paris is of special interest. In July, 1895, it reached the extraordinarily low figure of

CHART NO. 2.



Berlin, Paris, New York. Diphtheria and Croup. Number of deaths per 100,000 of population, 1886–1895.

4.8 per cent., while the highest record-rate (May, 1896) is but 15.9 per cent.

Chart No. 3 gives the number of deaths from diphtheria and croup, per 100,000 of population, in Berlin, Paris, and New York, from 1886 to 1895. In all three cities the ratio of deaths to population is lower in 1895, and the decrease from the ratio of the preceding year greater, than for any previous year, with the exception of Berlin, where the decrease of ratio from 1890 to 1891 is greater than that from 1894 to 1895. In Paris and Berlin, the actual number of deaths, independent of the population, is lower than for any previous year—in Paris most markedly so, less than one-half that of the lowest previous annual mortality (that of 1894), when antitoxin was already in use. In New York the decrease from the ratio of 1894 is in excess of any change in previous years, the decrease being thirty-three per cent. of the ratio of 1894, as compared with a decrease from 1889 to 1890 of twenty-four per cent. of the ratio of 1889, the largest previous change.

Tables 9 and 10 give the deaths from diphtheria and croup, in Paris and Berlin respectively, from January, 1889, to June, 1895, inclusive, by months. The remarkable decrease in mortality in Paris, coincident with the introduction of antitoxin, is well shown, the number of deaths per month falling off rapidly from June, 1894, while the annual mortality for 1895 exhibits a large decrease from previous years, being but forty-four per cent. of that in 1894, which is itself lower than that for any previous year, back to 1886, the figures before this date not being at command. In the week ending September 19, 1896, with eighty-five cases reported during this and the previous week, not a single death occurred from diphtheria or croup in the city of Paris.

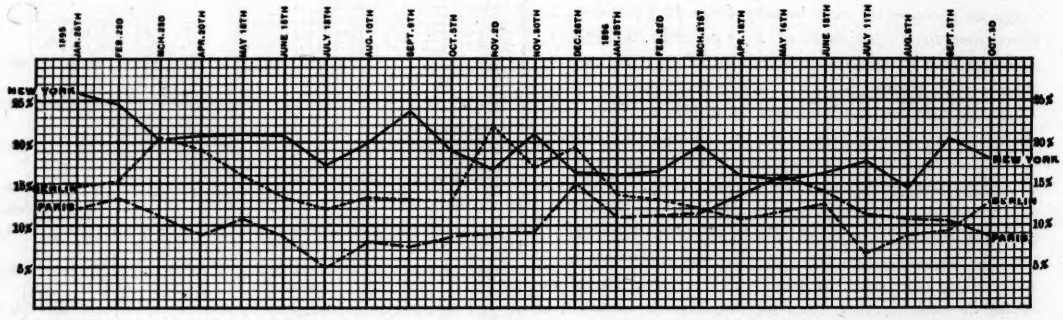
Table 11 gives the case fatality from diphtheria and croup in the Paris hospitals by months, quarters, and years, 1893 to 1895, inclusive, with a portion of 1896. Antitoxin was introduced into some of the hospitals some time in advance of its employment in the city at large (it having been used somewhat during June, July, and August, 1894, and generally, after September). The reduction in case fatality subsequent to its introduction is extraordinary. The lowest rate recorded in 1893 is for October (thirty-seven per cent.), while in 1894, prior to the introduction of antitoxin, the lowest rate is that for February (forty-seven per cent.). As compared with these, the highest rate in 1895 and 1896 is that for December, 1895 (19.7 per cent.). The quarterly and yearly statistics are equally striking. The lowest rate for 1893 and 1894, before the general use of antitoxin, is that for the third quarter of 1894 (forty per cent.), at which time antitoxin was already in use to a considerable extent, while the highest subsequent rate is that for the second quarter of 1896 (seventeen per cent.). For the year 1895, the rate reaches the extraordinarily low figure of 13.6 per cent., as compared with 51.4 per cent. for 1893, 50.3 per cent. for the first three quarters of 1894, and 35.5 per cent. for the year (one-quarter year, antitoxin in use).

Here, as in all other tables presented, the case fatality rapidly decreases with the introduction and increasing use of antitoxin, although in each of the three cities, this took place at a time when the case fatality is normally on the increase with the advent of cold weather.

Table 12 presents statistics for the Berlin hospitals similar to those given for Paris in table 7. They are unfortunately incomplete, no figures for 1894 being at command, and for 1893 the annual figures only. A comparison of the case fatality for 1893 with that for 1895 is, however, entirely confirmatory of the figures previously considered. The rate for 1893 is forty-four per cent.; that for 1895, 15.7 per cent.

Considering as a whole the facts and figures presented above, we observe that a large and rapid decrease in the absolute number of deaths from diphtheria and croup has taken place at certain times in three cities, of varying climatic conditions and different nationalities, in which these diseases are endemic. An extraordinary decrease in the case fatality from these diseases has also occurred, and this fatality has not subsequently risen to any extent in a period of some twenty-two months, and is now, in New York, far lower than at any period in the previous twenty-two years. This decrease did not take place at the same time in each of these cities. It occurred in New York some months later than in Berlin, and in Berlin some months later than in Paris. It has, however, occurred

CHART NO. 3.



New York, Paris. Diphtheria and Croup. Berlin. Diphtheria, only. Case fatality, periods of four weeks. 1895–1896.

in all three cities at a period of the year when, from the history of former years, an increase in the mortality would be expected. The reduction in mortality has occurred in hospital practice as well as throughout the cities at large. It seems evident that some influence, hitherto inoperative, must have come into action to produce the results outlined above. Upon investigation, it appears that all of the results described have followed closely upon the introduction of diphtheria antitoxin, and have become more marked in close coincidence with its increasing use as a remedy for the treatment of diphtheria. The conclusion seems therefore inevitable that we owe to antitoxin the remarkable decrease noted in the mortality from diphtheria and croup.

TABLE XI.—PARIS HOSPITALS: DIPHTHERIA AND CROUP; CASES AND DEATHS, WITH CASE FATALITY, BY MONTHS.

Month.	1893.			1894.			1895.			1896.		
	Cases.	Deaths.	Case Fatality.	Cases.	Deaths.	Case Fatality.	Cases.	Deaths.	Case Fatality.	Cases.	Deaths.	Case Fatality.
January	208	126	60.6	210	128	61.0	286	49	17.1	266	37	13.9
February	143	54	37.7	202	95	47.0	264	40	15.2	278	44	15.9
March	231	119	51.5	232	125	53.9	270	33	12.2	272	30	13.2
April	219	122	55.7	230	117	50.9	264	30	11.4	252	47	18.6
May	147	87	59.2	204	106	52.0	212	25	11.8	230	35	15.0
June	178	95	53.3	115	34	29.6	143	15	10.5	...	..	....
July	120	62	51.7	153	56	36.6	160	18	11.2	...	..	....
August	108	42	38.9	131	49	37.4	138	22	15.9	...	..	....
September	111	55	49.5	151	29	19.2	162	15	9.3	...	..	....
October	108	40	37.0	205	29	14.2	221[1]	26[1]	11.8	...	..	....
November	111	68	61.3	272	35	12.9	235	29	12.3	...	..	....
December	198	98	49.5	350	34	9.7	309	61	19.7	...	..	....
Totals	1882	968	51.4	2355	837	35.5	2664	363	13.6	...	..	....

[1] Monthly reports not available; figures are taken from the weekly reports.

THE SAME, BY QUARTERS AND YEARS.

Quarter.	1893.			1894.			1895.			1896.		
	Cases.	Deaths.	Case Fatality.	Cases.	Deaths.	Case Fatality.	Cases.	Deaths.	Case Fatality.	Cases.	Deaths.	Case Fatality.
First quarter	582	299	51.4	644	348	54.0	820	122	14.9	816	117	14.3
Second quarter	544	304	55.9	549	257	46.8	619	70	11.2	482[1]	82[1]	17.0
Third quarter	339	159	46.9	335	134	40.0	460	55	12.0	...	...	....
Fourth quarter	417	206	49.4	827	98	11.8	765	116	15.3	...	...	....
Year	1882	968	51.4	2355	837	35.5	2664	363	13.6	...	...	....

[1] April and May only.

TABLE XII.—BERLIN HOSPITALS: DIPHTHERIA AND CROUP; CASES AND DEATHS, WITH CASE FATALITY, BY QUARTERS AND YEARS.

Quarter.	1893.			1895.			1896.		
	Cases.	Deaths.	Case Fatality.	Cases.	Deaths.	Case Fatality.	Cases.	Deaths.	Case Fatality.
First quarter	Monthly figures for 1893 are not reported.			737	141	19.1	628	80	12.7
Second quarter				712	73	10.3	472	71	15.0
Third quarter				845	125	14.8	...	..	....
Fourth quarter				850	154	18.1	...	..	....
Year	2570	1132	44.0	3144	493	15.7	...	..	....

(The Berlin hospital statistics for 1894 are not available.)

NOTE.—The case fatalities for both Berlin and Paris hospitals are calculated on the sum of the total cases discharged by death or recovery during each month, quarter, or year. The number of cases admitted during and remaining in hospital at the end of each month, quarter or year is not given in the statistics.

The following *résumé* of the statistics and reports on the antitoxin treatment of diphtheria begins with the first extensive application of the new remedy in the early part of 1894, and brings the subject as nearly as possible up to date (October 1, 1896).

In reviewing the reports which have been published in the various medical journals of the Continent of Europe, Great Britain, and the United States, such a mass of material has been found that it has been no easy matter to sift and condense it in such a way as to make it available for the purpose desired.

Several collective investigations of the antitoxin treatment of diphtheria have already been published in Germany and this country by Heubner, Monti, Eulenberg, Crandall, Foster, Welch, the *Kaiserliches Gesundheitsamt* in Berlin and others; and though in making these investigations the whole field has been carefully gone over, there has been no hesitation in following the paths which others have marked out. Special acknowledgment of obligation for assistance, however, is due to Welch's most admirable article on the subject.

It is hoped that such a compilation of the results obtained by a large number of the best scientific and clinical observers in all parts of the world, from a thorough trial of antitoxin for a period extending over two years, may be of use and interest, not only in demonstrating the value of the remedy, but also in inducing a still more extended application of what may now be confidently affirmed to be a specific against one of the most terrible diseases with which we have to deal.

The first report of experiments made with the blood serum of immunized animals was communicated by Behring and Wernicke to the Seventh International Congress of Hygiene and Demography, held in London, August, 1891. In 1892 these authors published a second article describing more fully the principles of serum-therapy as applied to diphtheria. The earliest report of cases treated with antitoxin was in 1893, and consisted of thirty cases of diphtheria treated by Behring in the Institute for Infectious Diseases in Berlin. At this time the serum employed was very weak in antitoxin, but later, Behring and Ehrlich succeeded in obtaining a stronger serum (though for some time the serum did not have the strength which is now considered to be necessary for curative purposes). In April, 1894, 233 cases of diphtheria treated in the Berlin Hospitals, with a mortality of twenty-three per cent., were reported by Ehrlich, Kossel, and Wassermann. Dr. Otto Katz reported to the Berlin Medical Society on June 27, 1894, the results of the antitoxin treatment of 128 cases from March 14, 1894, in Professor Baginsky's service in the *Kaiser und Kaiserin Friederich Kinder-Krankenhaus* in Berlin. The serum used in these cases was Aronsons' serum obtained from horses. A few weeks later Baginsky reported 163 cases in all with a mortality of 12.9 per cent. Several reports now appeared of similar results obtained during the latter part of 1893 and the first part of 1894.

It remained, however, for Roux to arouse the interest of the world in the discovery which Behring had announced three years before. His masterly address delivered at the Eighth International Congress of Hygiene and Demography held in Budapest, September, 1894, in which he gave a clear and forcible description of his experiments and results in the treatment of 300 cases of diphtheria with antitoxin in the *Hôpital des Enfants Malades* in Paris, really directed the attention of the whole medical profession to this subject, and with this may be said to have begun the first extensive application of the new treatment for diphtheria.

In reviewing the subject of the antitoxin treatment of diphtheria it will be found that its value has been tested chiefly in two ways: the first is by a study of statistics which show the absolute mortality in cities and hospitals before and since the introduction of antitoxin and the comparative mortality of series of cases treated by antitoxin with that of similar series treated previously, or simultaneously, in other ways; the other is by the clinical method, the observation of the effect of antitoxin upon the course of the disease.

All statistics are open to fallacies owing to varying factors and conditions. The age of the patient is a most important factor in determining the mortality in diphtheria, either with or without the use of antitoxin, and unless the age is stated, the statistics are of little value.

Different methods of diagnosis may also lead to errors in the conclusions. The diagnosis of the cases treated by antitoxin has been usually verified by bacteriological examination, whereas in former times the diagnosis was mostly clinical. A bacteriological examination enables us now to exclude from our statistics many cases of angina which would formerly have been included. These cases are less severe than cases of true diphtheria, and on this account the statistics of mortality in the older reports are lower than they should be. On the other hand, a bacteriological examination often enables us to recognize as diphtheria mild cases of angina, which in former days would not have been included in diphtheria statistics. It is not likely, however, that among hospital patients the number in this class is as large as in the other. Experience, moreover, has shown that the cases, which on bacteriological examination have proved to be true diphtheria, when subjected to the former methods of treatment have given the highest mortality.

Another question to be considered is the severity of the epidemic. This not infrequently varies in different times and places. The only way to avoid the fallacy thus arising is to take a large number of cases for comparison occurring in widely separated places and over an extended period of time, and to compare cases treated with and without antitoxin at the same time and in the same place.

Again, it is maintained by some that the low rate of mortality in diphtheria, which has been ascribed by its advocates to the antitoxin treatment, is due to a large increase in the number of cases, a milder type of the disease being now received into the hospitals, owing to the early treatment recommended under the new method, while formerly only the severest cases were brought for treatment. This is possibly true to a certain extent in some hospitals, but it does not account for the great difference in the total mortality between the old and the new treatment; then, too, many cases are now excluded, as all

cases admitted into the hospitals are bacteriologically diagnosed and treated only with antitoxin when found to be true diphtheria, and the remaining cases if not brought for early treatment would frequently have developed into severe or fatal cases.

Regarding the value of the evidence as to the efficacy of the remedy based on clinical study, this, of course, depends upon the confidence we place in the opinions formed by the individual observers. But when the opinions, expressed by many of the best clinical observers in Germany, Austria, France, England, and America, etc., are almost unanimously in favor of it; and when we consider that the majority of these men, if not absolutely opposed to the new treatment, were very timid and cautious in adopting it, and have reached their conclusions only after the most convincing proofs based on practical results, it would seem that there were no longer any reasonable grounds for refusing to accept the opinion of the vast majority.

It remains now to present a series of statistical tables showing the results of the antitoxin treatment up to the present time. The statistics contain all the larger series of cases which have been reported up to date (omitting the statistics of the New York Board of Health, which are given separately), which it has been possible to find in the library of the Academy of Medicine. The list is not complete, as no single or isolated cases have been taken, only series of cases of ten and over. There has been no selection of cases, and no reduplication so far as known, certainly none that could be avoided.

The results obtained by different observers naturally vary somewhat, taken as they are from so many different sources treated under such varying conditions, and with such different preparations of antitoxin, and yet, on the whole, the apparent unanimity is all the more remarkable on this very account, and proves that the total results arrived at are reasonably true and conclusive. Admitting all possible accidental errors which may have arisen—and it is simply preposterous to assume that intentional errors have been committed by scientific observers in every part of the world—the fact remains that in over 24,000 cases of diphtheria treated with antitoxin, which have been reported, the mortality has been apparently reduced by fully fifty per cent.

Summaries of the various tables, prepared from the collected reports follow:

TABLE I.—MORTALITY OF CASES OF DIPHTHERIA TREATED WITH ANTITOXIN AND PREVIOUS OR SIMULTANEOUS PERCENTAGE OF MORTALITY WITHOUT ANTITOXIN.

This table gives the number of cases treated with antitoxin, the number and percentage of deaths, and the previous or simultaneous percentage of mortality without antitoxin, contained in 158 reports of larger series of cases, in hospital and private practice. These cases include not only those which, in the early use of antitoxin, were given insufficient doses, but also the cases which were moribund at the time of the first injection or died within twenty-four hours after it.

In a total of 24,768 cases treated with antitoxin, there were 4004 deaths, or an average mortality of sixteen per cent. The following is a summary of the results obtained in hospital and private practice:

SUMMARY OF TABLE I.

	Cases.	Deaths.	Mortality, per cent.	Previous Mortality, per cent.
In 109 reports from hospital practice	15,560	3009	19.0	30 to 40
In 49 reports from private practice	9208	995	10.1	
Total in 158 reports	24,768	4004	16.0	30 to 40.0

In 109 reports from hospitals, there were 15,560 cases, with 3009 deaths, or a mortality of 19 per cent. with the antitoxin treatment; in 49 reports from private practice, there were 9208 cases, with 995 deaths, or a mortality of 10.1 per cent., or, in a total of 24,768 cases, there were 4004 deaths, a mortality of 16 per cent., as against a previous or simultaneous mortality of 30 to 40 per cent. (taking the lowest figures in the reports) without antitoxin.

It would appear, therefore, according to these reports, that there has been a reduction of mortality in diphtheria, in both hospital and private practice, of at least fifty per cent., as the result of the antitoxin treatment. The lower percentage of mortality in private practice is probably due to the fact that the patients usually come under treatment in an earlier stage of the disease, and are generally more favorable cases.

TABLE II. MORTALITY OF CASES OF DIPHTHERIA TREATED WITH AND WITHOUT ANTITOXIN.

This table gives the number of cases (taking the reports which show these data) treated *with* and *without* antitoxin, and the percentage of mortality. These cases were treated simultaneously or during intervals of forced interruption of the antitoxin treatment, or in the periods immediately before and after the antitoxin treatment.

SUMMARY OF TABLE II.

	Cases.	Deaths.	Mortality, per cent.
Hospital cases with antitoxin	7986	1754	21.0
Hospital cases, without antitoxin	9039	3309	36.4
Private cases, with antitoxin	3161	412	13.0
Private cases, without antitoxin	4255	1717	40.0
Total in 45 reports, with antitoxin	11,147	2169	19.1
Total in 45 reports, without antitoxin	13,294	5026	37.8

From 45 reports in which these cases were recorded it appears that there were 11,147 cases treated *with* antitoxin, resulting in 2169 deaths, or a mortality of 19.1 per cent.; while at the same time, or during the period immediately before or after the antitoxin treatment, there

were 13,294 cases treated *without* antitoxin, with 5026 deaths, or a mortality of 37.8 per cent.

Separating the hospital and private cases there were treated in hospital 7986 cases *with* antitoxin, with a mortality of 21 per cent., as against 9039 cases treated *without* antitoxin, with a mortality of 36.4 per cent. In private practice there were 3161 cases treated *with* antitoxin, resulting in a mortality of 13 per cent., as against 4255 cases treated *without* antitoxin, with a mortality of 40 per cent.

Thus put to the severest test, selecting only the worst cases, as was often done intentionally for purposes of control, and to determine the value of the new remedy (though occasionally it was an unfortunate necessity, owing to the lack of antitoxin, as some reports show, which compelled a forced interruption of the antitoxin treatment) there is still a difference of 50 per cent. in favor of the antitoxin treatment. Surely no effect of climate, or season, or "genius epidemicus," or any of the various theories brought forward by the opponents of antitoxin, can explain the difference in these results. Some other and more powerful factor than any or all of these was evidently at work to produce such a striking contrast in the practical results from two modes of treatment applied at the same time, or under identically the same conditions, by so many different observers.

Some of the details of the most striking of these groups of cases which were treated *with* and *without* antitoxin at the same time, or during intervals of forced interruption, may be tabulated as follows (the full table will be published elsewhere):

TABLE III.

	With Antitoxin.			Without Antitoxin.		
	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
1. Hospital d. Enfants Maladies, Paris....	300	78	26.0	....	....	....
2. Hospital Trousseau, Paris	....	....	....	520	316	60.0
3. Hospital Franz Joseph.....	110	14	12.7	144	62	43.0
4. Unterholzner.....	37	8	25.8	36	24	66.0
5. Epidemic, Triest...	321	56	17.1	427	213	50.0
6. Kaiser and Kaiserin Friederich Hospital, Baginsky.....	303	39	13.2	230	70	47.8
7. Vucetig.....	30	2	6.6	30	6	20.0
8. Austrian statistics..	1128	149	13.2	1849	704	38.1
9. Rauchfuss (Russia).	34	7	21.0	30	16	52.0
10. V. Engel.....	39	10	25.5	62	31	50.0
11. Charité Hos., Berlin	299	53	16.7	....	....	....
12. Bethany Hos., B'rlin	....	....	....	249	12	43.1
13. Blumenfeld.....	229	20	8.7	48	11	23.6
Totals	2930	436	14.9	3625	1455	40.0

In a total of 2930 cases treated *with* antitoxin, 436 died, giving a mortality of 14.9 per cent., while of 3625 cases treated *without* antitoxin at the same time, or during intervals of forced interruption (owing to lack of antitoxin) 1455 died, a mortality of 40 per cent.

EXPLANATORY NOTES REGARDING THE STATISTICS IN TABLE NO. III.

Roux reports 300 cases treated with antitoxin in the *Hôpital des Enfants Malades* (1) in Paris with a mortality of 26 per cent, at the same time that 520 cases were treated without antitoxin in the *Hôpital Trousseau* (2) with a mortality of 60 per cent. The previous mortality in these hospitals had been about the same; the time, the type of the disease, every condition was the same, except the mode of treatment, and the resulting mortality.

Ganghofner reports 110 cases treated with antitoxin in the *Franz Josef Clinic* (3) in Prague with a mortality of 12.7 per cent, while during an interval of forced interruption in the same hospital, owing to the supply of antitoxin having run out, 144 cases were treated without antitoxin with a mortality of 43 per cent.

Unterholzner (4) in the *Leopoldstadt Hospital* in Vienna records the results in 37 cases with antitoxin in which the mortality was 25.8 per cent., and 36 cases without antitoxin during an interruption of the antitoxin treatment, in which the mortality was 66 per cent.

During an epidemic of malignant diphtheria in the districts of Triest (5) and Bukowina, the Austrian Health Department sent out a supply of antitoxin to be used among the people. Before the antitoxin arrived the mortality had been fearful in these districts. Three hundred and twenty-one cases were treated with antitoxin with a mortality of 17 per cent. The supply of antitoxin sent was insufficient to furnish the whole section in which the epidemic was raging. Four hundred and twenty-seven cases were treated without antitoxin, and the mortality among these was 50 per cent.

Baginsky (6) records a most striking illustration of the effects of antitoxin in the *Kaiser und Kaiserin Friedrich Kinder-Krankenhaus* in Berlin—a result so striking that it converted Professor Virchow, who, up to that time, had been an opponent of the new treatment. In eight weeks in this hospital 63 cases had been treated with antitoxin with a mortality of less than 13 per cent. Suddenly the supply of serum gave out, as unfortunately the horse from which the serum had been taken died. The old methods were resorted to, and during the next seven weeks, 109 cases were treated without antitoxin with 55 deaths, or a mortality of over 50 per cent. This increase in the mortality induced the hospital authorities to return to the use of the serum. Immediately there was a change. In the next six weeks 84 cases were treated with a mortality of less than 15 per cent. The total figures are given in the table.

In speaking of this remarkable experience Professor Virchow said "All theoretical considerations must give way to the brute force of these figures, and I consider it the duty of every physician to use a remedy giving such clinical results."

Baginsky, in commenting on this circumstance, says: "It is all the more remarkable, as the ratio of mortality of those treated with the serum, before and after the period of interruption varied within very small limits. If one will permit figures to speak at all, there has scarcely been made on human beings a more demon-

strative test of the curative power of a therapeutic agent. It was an experiment forced upon us, but it proved to us how terrible was the form of disease which we were treating, and how numerous would have been the victims without the use of the healing serum."

Professor Virchow again reiterated his opinion in a report which was read on the antitoxin treatment of diphtheria in the same hospital, on December 25, 1895, when he said, that from April to November of that year 303 cases out of 335 treated had recovered, the mortality which had formerly been 43 per cent. having decreased to 9½ per cent.

Vucetig (7) reports two groups of cases of 30 each, one treated with antitoxin and the other with Loeffler's solution; the antitoxin cases gave a mortality of 6.6 per cent., the others a mortality of 20 per cent.

According to the official records of the Austrian Health Department, (8) there were treated during the month of February (1896) in all Austria 1128 cases with antitoxin with a mortality of 13.2 per cent., whereas 1849 cases which were treated without antitoxin at the same time gave a mortality of 38 per cent.

Rauchfuss (9) reports 34 cases treated in hospital with a mortality of 21 per cent., and 30 control cases treated at the same time without antitoxin with a mortality of 52 per cent.

Von Engel (10) in Bohemia reports 39 cases treated with antitoxin with a mortality of 25.5 per cent., and 62 cases treated at the same time without antitoxin with a mortality of 50 per cent. The antitoxin cases, in these reports, are said to have been unusually severe and therefore taken as a test of the new remedy.

Heubner (11) reports 299 cases treated with antitoxin in the *Hôpital Charite* in Berlin with a mortality of 16.7 per cent., and 249 cases treated in the Bethany Hospital (12) at the same time under the same conditions of age, season, etc., without antitoxin with a mortality of 43 per cent.

Blumenfeld (13) reports 229 cases treated in private practice with antitoxin with a mortality of 8.7 per cent., and 48 cases not treated with antitoxin, because they were considered to be *too mild*; the mortality among the "mild cases" was 23.6 per cent. as against 8.7 per cent. among the apparently severer cases treated with antitoxin.

Many examples of the same kind might be cited from the published reports, fuller details of which will be found in the Bulletin of the Health Department, but from these it may be seen that the antitoxin treatment has stood the test of comparison with other approved methods of treatment, whenever the contrast has been decidedly drawn.

KOSSEL'S STATISTICS OF REDUCTION IN THE ABSOLUTE MORTALITY FROM DIPHTHERIA AND CROUP.

It has been maintained by some in criticizing the statistics of the antitoxin treatment, that the reduction of the death-rate, as shown by the mortality percentage, proves nothing, if at the same time there has been an increase in the number of cases reported, as the reduced mortality rate may have been due to the milder character of the cases treated; and that the only convincing figures are those which show, not a reduction of *percentage* mortality, but of *absolute* mortality.

Kossel has undertaken to satisfy this *desideratum* in the following statistics:

I.—In the *Hôpital Charite* in Berlin there were admitted during the years 1886 to 1893–94, an annual average of 146 diphtheria patients, of whom 78, on the average, died; in 1894–95 and 1895–96, 285 were admitted, of whom 40 died. The absolute mortality, therefore, during the serum period (1894–95 and 1895–96) was reduced to one-half of the average for the previous eight years, though the number of cases admitted had increased two-fold.

II.—THERE WERE REPORTED IN ALL THE BERLIN HOSPITALS THE FOLLOWING CASES AND DEATHS FROM DIPHTHERIA DURING THE ELEVEN YEARS, 1885–1896:

Year.	Cases.	Deaths.
1885	1928	789
1886	1738	609
1887	1636	589
1888	1446	523
1889	1623	573
1890	1792	695
1891	1764	623
1892	2074	837
1893	2450	951
1894	2890	801
1895	3061	484

It appears from these statistics that in the Berlin hospitals, as a whole, the deaths have been reduced one-half since the introduction of antitoxin, though the number of cases reported has steadily increased. The statistics for 1896 show a still larger reduction in the absolute and case mortality.

III.—THE FOLLOWING TABLE GIVES THE CASES AND DEATHS REPORTED IN BERLIN AND THE DEATHS IN PARIS (CASES NOT REPORTED PREVIOUS TO 1894) FROM 1886 TO 1896:

Year.	Berlin.		Paris.
	Cases.	Deaths.	Deaths.
1886	6968	1662	1524
1887	5438	1392	1564
1888	4190	1195	1718
1889	4220	1210	1706
1890	4586	1601	1639
1891	3504	1342	1363
1892	3683	1637	1398
1893	4315	1416	1262
1894	5220	1321	993
1895	6106	987	411

According to these figures the mortality from diphtheria rose and fell in Berlin, corresponding more or less closely to the number of cases reported up to the year 1894. In 1894 and 1895 the cases increase in number, while the absolute mortality declines, and in Paris, in 1895, it decreases to less than one-third of the previous average. The statistics for Berlin for 1896 (see previous tables) show an equal reduction. Antitoxin was more lowly introduced there than in Paris.

IV.—THE ABSOLUTE MORTALITY AND DEATHS PER 100,000 POPULATION IN ALL GERMAN CITIES OF OVER 15,000 INHABITANTS, FROM 1886–1895:

Year.	Absolute Mortality.	Deaths per 100,000.	
1886	12,211	124	Average from 1886 to 1894, 106.
1887	10,970	107	
1888	10,142	96	
889	11,919	108	
890	11,915	105	
1891	10,484	84	
1892	12,365	97	
1893	16,557	130	
1894	13,790	101	
1895	7611	53	

This table shows a steady rise in absolute mortality up to 1894, when there was a moderate reduction, followed by a very great reduction in 1895, when antitoxin was generally used in the German cities. The sudden fall in the absolute mortality from diphtheria amounts to one-half the average of the previous nine years.

V.—MONOD, THE DIRECTOR OF THE PUBLIC HEALTH DEPARTMENT OF FRANCE, HAS GIVEN THE AVERAGE ABSOLUTE MORTALITY FROM DIPHTHERIA PER MONTH FOR THE FIRST SIX MONTHS OF EACH YEAR FROM 1888 TO 1895, AND FOR 1895, IN ALL FRENCH CITIES OF OVER 20,000 POPULATION:

Month.	1888–1895.	1895.
January	469	205
February	466	187
March	499	155
April	442	160
May	417	113
June	334	84
Totals	2,627	904

The Pasteur Institute in Paris began the distribution of antitoxin in November, 1894. Early in 1895 arrangements were made to furnish antitoxin free to those who were unable to pay for it. In 108 cities of over 20,000 inhabitants, with an aggregate population of 8,150,000, the average number of deaths from diphtheria during the first six months of the seven years, 1888–1895, was 2,627. In the first six months of 1895 the absolute mortality from diphtheria in the same 108 cities was only 904, or a diminution at the rate of 65.6 per cent. The rate of diminution, month by month, went on almost uniformly from one of 56.2 per cent. for the month of January, to 75 per cent. for the month of June.

The use of antitoxin began in Paris and Berlin in the latter part of 1894, and was general in 1895; in New York antitoxin was introduced by the health department in 1895, and is only now becoming generally used.

Taking all these figures together it would seem to have been conclusively proved that, whether we estimate the percentage mortality, or whether we consider the absolute death-rates reported in hospitals or cities as a whole, there has been a marked and sudden reduction in mortality from diphtheria since the introduction of antitoxin. To what else should this be attributed if not to the effects of the antitoxin treatment? It would be a strange coincidence, indeed, which produced by natural causes such a diminution in the death-rate of a disease that had continued unchanged, within slight variation, for many successive years, and then dropped to one-half during the period corresponding to the use of antitoxin, if it were not due to the improved method of treatment.

VI.—FROM STATISTICS TAKEN FROM THE OFFICIAL RECORDS OF BERLIN, PARIS, AND NEW YORK, ON FILE IN THE OFFICES OF THE NEW YORK HEALTH DEPARTMENT, THE FOLLOWING DEATH-RATES FROM DIPHTHERIA AND CROUP, ESTIMATED PER 100,000 POPULATION, ARE GIVEN:

ABSOLUTE DEATH-RATE PER 100,000 POPULATION.

Year.	Berlin.	Paris.	New York.
1886	125.7	73.2	187.5
1887	100.7	76.9	206.6
1888	76.1	83.7	167.7
1889	85.6	79.9	146.2
1890	102.0	77.5	110.6
1891	67.5	63.0	118.7
1892	92.9	63.6	123.3
1893	100.8	51.4	145.5
1894	86.7	40.7	158.5
1895	59.7	17.7	105.2
1896	30.9	17.5	91.3

TABLE IV.—COLLECTIVE INVESTIGATIONS.

This table has been prepared in order to compare the results noted in the present report, with the collective investigations of other observers. It gives the total results reported of the antitoxin treatment, and the previous mortality without antitoxin, in twelve collective investigations, published in Germany, Austria, Japan, and the United States. It is seen, by a comparison of these reports, that each and all of them record almost exactly the same results, *viz.*, that the mortality from diphtheria has apparently been reduced.

TABLE IV.—COLLECTIVE INVESTIGATIONS OF OTHER OBSERVERS OF THE SAME OR SIMILAR CASES TREATED WITH ANTITOXIN, AND PREVIOUSLY, WITHOUT ANTITOXIN.

Reporter.	Treated with Antitoxin			Treated previously or without Antitoxin: Mortality, per cent.
	Cases.	Deaths.	Mortality, per cent.	
Heubner, Berlin	3036	625	20.6	38 to 40.0
Monti, Vienna	3888	716	18.4	.....
Crandall, St. Louis	2632	442	16.8	42.0
Forster, Washington	2740	509	18.5	45.3
Eulenburg and Schwalbe, Berlin	5833	559	9.6	14.7
Welch, Baltimore	7160	1239	17.3	42.0
Kaiserl. Gesundh. Amt. (Berlin):				
First quarter 1895	2228	386	17.3	.....
Second quarter 1895	2130	306	14.3	26.7
Hilbert, Königsberg	7663	1282	16.6	38 to 40.0
Paltauf, Vienna	1207	138	11.3	38 to 40.0
Loddo, Japan	10,000	1800	18.0	44.0
American Ped. Society	5794	713	12.3	.....
Totals	54,317	8715	16.1	30 to 40.0
Present report to October, 1896	24,768	4004	16.0	30 to 40.0

It would thus appear from this table that twelve different observers, analyzing the same or similar cases treated with antitoxin, have arrived at identically the same result, *viz.*, that the mortality of diphtheria, according to the published reports, has been reduced at least one-half as the effect of the antitoxin treatment; the average mortality for the antitoxin cases being sixteen per cent., including hospital and private practice, and thirty to forty per cent. for the cases treated previously or without antitoxin. There is naturally in this table, in many instances, a reduplication of cases; they are put together merely to show the uniformity of the results of the collective investigations.

There is a reduction of at least one-half, as the effect of the antitoxin treatment, the average mortality for the antitoxin cases being sixteen per cent., including hospital and private practice, and thirty to forty per cent. for the cases treated previously or without antitoxin.

TABLE V.—MORTALITY OF OPERATIVE AND NON-OPERATIVE CASES OF DIPHTHERIA TREATED WITH ANTITOXIN.

One of the most significant effects of the antitoxin treatment of diphtheria, and that which affords the best proof of its value, is shown in the remarkable results, which have been obtained in cases of laryngeal diphtheria with stenosis, which include the severest and most fatal forms of the disease.

This table gives the cases, deaths, and percentage of mortality in operative and non-operative cases of diphtheria treated with antitoxin as compared with the previous or simultaneous mortality in operative cases without antitoxin.

SUMMARY OF TABLE V.

	Total Cases Treated.			Non-operative Cases.			Operative Cases.			Previous Mortality, per cent.
	Cases.	Deaths.	Mortality, per cent.	Cases.	Deaths.	Mortality, per cent.	Cases.	Deaths.	Mortality, per cent.	
Total in 72 reports..	15,148	2626	16.6	12,066	1491	13.5	3082	1135	36.7	70.0

Of the 3082 operative cases 1355 were tracheotomized, resulting in 569 deaths, or a mortality of 42 per cent.; 1173 cases were intubated with 361 deaths, or a mortality of 30.8 per cent.; 52 cases intubated required secondary tracheotomy, of which 37 died, or 71 per cent.; 502 cases required tracheotomy or intubation (it was not stated which) with 168 deaths, or a mortality of 33.2 per cent.

According to a report of 12,736 cases up to 1887 published by Monti, the mortality in tracheotomy previously was 73.3 per cent. Hirsch gives from statistics collected in von Bergmann's clinic the average previous mortality in tracheotomy cases for the last ten years up to July, 1894, at 68.5 per cent. Of 5546 intubation cases collected by McNaughton and Maddren[1] (1892) the previous mortality was 69.5 per cent. Brown has shown since somewhat better results in intubation, *viz.*, a mortality of 51.6 per cent.

[1] Collective Investigation of the American Ped. Soc., July, 1896.

In a total of 15,148 cases treated with antitoxin in this table taken from 72 reports, there were 2626 deaths, or a mortality of 16.6 per cent.; of these 12,066 cases were not operated on, (80 per cent.) of which 1491 died, giving a mortality of 13.5 per cent.; 3082 were operated on, intubation or tracheotomy, of which 1135 died, or 36.7 per cent. Before the antitoxin treatment 40 per cent. of all cases are reported generally as having required operation, and the previous mortality was 70 per cent. for all operated cases, according to the average figures recorded in these reports.

But taking the lowest average recorded at all in any reports, *viz.*, 68.5 per cent. as the previous mortality in tracheotomy cases, and 51.6 per cent as the previous mortality in intubated cases, and the contrast in these figures and those obtained under the antitoxin treatment is sufficiently evident. Here again, in operative cases of the severest forms of the disease the mortality seems to have been reduced by nearly fifty per cent. as the result of the antitoxin treatment; while at the same time the number of cases requiring operative interference has decreased to one-half. This last effect of the serum treatment is due to the fact that many cases of beginning laryngeal stenosis are relieved after injection, without having recourse to operation, few or no cases, which were free of laryngeal obstruction when the antitoxin was injected, being reported as having developed such symptoms later.

TABLE VI.—MORTALITY OF CASES TREATED WITH ANTITOXIN ARRANGED ACCORDING TO AGE.

As age is an important factor in estimating the value of any treatment of diphtheria, these statistics have been collected from all the reports in which the age was mentioned, and arranged in the form of a table. The reports of age mortality, however, have not been uniformly or systematically recorded; but the main features of the table may be summarized as follows:

SUMMARY OF TABLE VI.

Age.	Cases.	Deaths.	Mortality, per cent.
0–2 Years.....	1494	469	31.4
2–5 "	3678	762	20.7
5–10 "	3184	473	14.8
Over 10 Years.....	1444	99	6.9

Comparing these results with those obtained previously or without antitoxin the following have been reported:

Herz: Mortality, per cent.	Hirsch: Mortality, per cent.	Baginsky: Mortality, per cent.
0–1 Year 80.0	0–1 Year.....88.3	0–2 Years.....63.3
1–3 " 45.0	1–3 " 82.5	2–4 " 52.8
3–5 " 40.0	3–4 " 63.9	4–6 " 37.9
5–10 " 17.0	4–5 " 46.9	6–10 " 24.6
Over 10 Years...17.0	6–7 " 43.2	10–15 " 14.6
	Over 7 Years..22.2	

The contrast here shown of the results of treatment *with* or *without* antitoxin, arranged according to age, is sufficiently evident and needs no further comment.

TABLE VII.—MORTALITY OF CASES TREATED WITH ANTITOXIN ARRANGED ACCORDING TO THE DAY OF DISEASE ON WHICH TREATMENT WAS COMMENCED.

Behring claims that the specific curative effect of antitoxin will be the more certainly produced the sooner the treatment is commenced; and that out of 100 cases of *true diphtheria*, which are injected with a curative dose of antitoxin within forty-eight hours from the beginning of the disease, not more than five will die.

In order to test the truth of this statement, and to determine what has actually been effected by the use of the remedy, this table has been prepared, which gives the mortality of cases treated with antitoxin, arranged according to the day of the disease on which the treatment was begun. It is to be understood, as stated in all the reports, that these statistics are based in most cases upon the statements of parents or friends of the patients and may not be absolutely correct as to the exact day of the disease on which the antitoxin was administered, but they give nevertheless an average of the results obtained.

SUMMARY OF TABLE VII.

First and Second Day of Disease.			Third and Fourth Day of Disease.			After the Fourth Day.			Day Unknown.		
Cases.	Deaths.	Mortality, per cent.	Cases.	Deaths.	Mortality, per cent.	Cases.	Deaths.	Mortality, per cent.	Cases.	Deaths.	Mortality, per cent.
4232	267	6.3	3870	656	17.2	1984	685	34.6	339	44	13.0

Or, taking only those reports in which the day of disease on which treatment was commenced is more specifically stated, we have:

	Cases.	Deaths.	Mortality, per cent.
First day of disease.....	1415	51	3.5
Second day of disease....	2640	213	8.0
Third " "	2340	300	12.8
Fourth " "	1458	346	23.6
Fifth day and after.....	1912	671	35.0
Totals.....	9765	1581	16.1

According to these statistics it is apparent that by far the best results are obtained when treatment is commenced early in the disease, if possible within the first forty-eight hours, and not later than the third day; that after the third day the mortality increases rapidly, and that after the fifth day comparatively little benefit is derived from the use of antitoxin, though it should always be administered.

Considering the fact that in all these statistics are included the cases which were moribund at the time of the first injection, or which died within twenty-four hours after, there would seem to be very good reason to believe with Behring, Kossel, Roux, and other observers, that every fresh case of true pharyngeal diphtheria can be cured by the timely administration of an adequate dose of antitoxin, and that the claim, that only five per cent. of the cases injected within the first forty-eight hours of the disease would die, has actually been substantiated.

TABLE VIII.—IMMUNIZATION BY ANTITOXIN.

The question of immunization now comes up for consideration, and though but comparatively few complete statistics on this subject have been published, yet the prophylactive treatment of diphtheria is a matter of so great importance that this table has been prepared to show in how far (according to the reports already published) the administration of immunizing doses of antitoxin has resulted in protecting those exposed to infection. The data are incomplete and unsatisfactory, not only from the fact that many cases immunized have not been reported, but also because many reported as immunized have received insufficient doses of antitoxin; but such as they are the results are interesting as showing the complete protection apparently afforded to many persons exposed to the disease.

SUMMARY OF TABLE VIII.

Number of Cases Immunized.	Number of Antitoxin Units Injected.	Number of those Immunized Attacked Within 30 Days.	Number of those Immunized Attacked After 30 Days.
17,516	50 to 1000 (Average, 150 to 200).	109 mild, 1 fatal.	20 mild, 1 fatal.

According to thirty-five published reports, of which this is a summary, there are 17,516 persons, children and adults, to whom immunizing injections of antitoxin have been given, with the result that, though exposed to infection from diphtheria in families and institutions, and during epidemics when the disease was raging, only 131 of those immunized were attacked later, and of these 129 were mildly affected (109 within thirty days, and 20 after a month), and recovered; while only 2 died of the disease, one within and the other after thirty days from the time of injection. The two fatal cases probably received far too small doses to produce immunity, or the diphtheria was complicated with other diseases not mentioned. The mild cases all recovered, in some a repetition of the injection being given. Only some slight and temporary ill effects are described as having occasionally resulted from the immunizing injections, though in the *Hôpital des Enfants Malades* and the *Hôpital Trousseau* in Paris, and in Löhr's experiments, full curative doses were often given to healthy subjects. Rashes, joint-pains, and other transient effects of the antitoxin serum were occasionally observed, but no serious after effects which could be ascribed to the action of the antitoxin, or which would contra-indicate its use.

The prophylactive dose of antitoxin is now thought by most observers to be from 150 to 500 antitoxin units. The duration of immunity after injection has not been definitely determined, and undoubtedly varies. Some hold the opinion that it lasts only one or two weeks, others

that it extends over thirty days and more. Four weeks may probably be considered as the average duration.

NOTE.—The complete tables, of which these are only the summaries, will shortly be published, with a full report of the cases, in a scientific bulletin of the New York Health Department. They are omitted here, as they are too bulky for such an article.

The statistics given have been collected from reports of series of cases of diphtheria treated with antitoxin, published up to October 1, 1896, in the various medical journals of the world—Germany, France, England, Austria, Italy, Russia, Switzerland, Denmark, Australia, Japan, etc., and America,—accessible in the Library of the New York Academy of Medicine.

CONCLUSIONS.

We desire to bring out strongly and clearly the fact that it matters not from what point of view the subject is regarded, if the evidence now at command is properly weighed, but one conclusion is, or can be reached, whether we consider the percentage of mortality from diphtheria and croup in cities as a whole, or in hospitals, or in private practice; or whether we take the absolute mortality for all the cities of Germany whose population is over 15,000, and all the cities of France whose population is over 20,000 (in France and Germany antitoxin has been more generally employed than elsewhere); or the absolute mortality for New York City, or for the great hospitals in France, Germany, and Austria; or whether we consider only the most fatal cases of diphtheria—the laryngeal and operative cases; or whether we study the question with relation to the day of the disease on which treatment is commenced, or the age of the patient treated; it matters not how the subject is regarded or how it is turned for the purpose of comparison with previous results, the conclusion reached is always the same, namely, there has been an average reduction of mortality from the use of antitoxin in the treatment of diphtheria of not less than fifty per cent., and under the most favorable conditions a reduction to one-quarter, or even less, of the previous death-rate. This has occurred not in one city at one particular time, but in many cities, in different countries, at different seasons of the year, and always in conjunction with the introduction of antitoxic serum, and proportionate to the extent of its use.

Then, finally, there is to be added not only the experimental proof of the specific action of antitoxin in neutralizing the toxin of diphtheria, but also the overwhelming mass of evidence derived from the personal observations of the most distinguished practitioners of medicine of every country. There are to-day, in the whole civilized world not more than three or four active opponents of the antitoxin treatment of diphtheria, whose names were known to the medical profession before the introduction of antitoxin.

It is well to bear in mind the fact, that what is called conservatism in medicine is often only a cloak assumed to cover up indolence. The acceptance of a new principle, or a new fact, involves the expenditure of a certain amount of mental energy. Old ideas and conceptions must be discarded or readjusted to the new information acquired. This involves labor and effort, which some are not willing to expend. They are not willing to go over the data at hand and form conclusions for themselves, but shake their heads wisely, predict a reaction, and plead for conservatism. It is not possible now for any unprejudiced person to master the evidence available regarding the value of antitoxin in the treatment of diphtheria, and reach anything but a positive conclusion.

The deductions to be drawn from a review of these statistics and reports presented would seem to be self-evident and conclusive. The value of antitoxin in diphtheria is no longer a question of opinion or theory, but an established fact. "*Proberin geht ueber studerin*," those who have had the largest experience with the remedy, and have most thoroughly tested its merits, are most in favor of it. The few who oppose it have proved nothing in comparison with the enormous mass of evidence as to its specific value,

It may, therefore, be affirmed that the following facts have been demonstrated:

1. That diphtheria antitoxin, where generally employed, has reduced the mortality from diphtheria at least one-half.

2. That it has a distinctly favorable effect on the clinical course of the disease, shortening it and lessening its severity.

3. That the earlier the treatment is commenced the better the results obtained; the mortality, when adequate doses of antitoxin have been given with the first forty-eight hours of the disease, not exceeding five per cent.

4. That antitoxin is a specific against true diphtheria, (*i. e.*, where the symptoms are due solely to the Klebs-Loeffler bacillus) and is less efficacious in mixed infectious, but even in these forms of diphtheria is of decided benefit.

5. That it is not necessary to wait for a confirmatory bacteriological diagnosis, but that in every clinically suspicious case of membranous angina, especially in children, a medium dose of antitoxin should immediately be given, and repeated if required by the further developments of the case.

6. That antitoxic serum is a remedy without serious after-effects in the doses which have ordinarily been employed (the after-effects, such as rashes, etc., being insignificant in comparison with the danger of the disease); that it has no injurious action on the kidneys, the heart, or the nervous system; that it does not entirely prevent albuminuria, heart failure, and post-diphtheritic paralysis, because the effects of the diphtheritic toxin which has already entered the system before the administration of the remedy, no matter how soon the treatment is begun, are not always completely counteracted by the antitoxin, though there is every reason to believe that in sufficient doses it does prevent any farther extension of the toxic action after its affects have been produced.

7. That the protection conferred by immunizing doses of antitoxin is almost absolute for a short period of time, *e.g.*, three or four weeks, when a sufficient number of antitoxin units is administered, and that with a high grade preparation, where only small quantities of serum are re-

quired, the remedy is absolutely harmless even with the youngest infants.

8. That antitoxin, if not a specific cure for all forms of diphtheria occurring in the human subject, is by far the best remedy for the treatment of the disease.

To the critics of the antitoxin treatment I may repeat the words of a famous German poet, quoted by Professor Soltman:

"Das ist die richtigste Kritik von der Welt,
Wenn neben das was ihm missfällt,
Einer etwas Ergens and Besseres stellt."

Or, in other words:

"The best critics in the world are they
Who along with that which they gainsay,
Suggest another and a better way."

REVIEWS.

A TREATISE ON OBSTETRICS. For Students and Practitioners. By EDWARD P. DAVIS, A.M., M.D., Professor of Obstetrics and Diseases of Infancy in the Philadelphia Polyclinic; Clinical Professor of Obstetrics in the Jefferson Medical College, Philadelphia, Etc., Etc. Illustrated with 217 engravings and 30 plates in colors and monochrome. Lea Brothers & Co., Publishers, Philadelphia and New York. 1896.

THE aim of the author in writing this treatise on obstetrics is, as he states, "to furnish to the student a text-book, and to the practitioner a work of reference." Generally speaking, he has attained his object admirably, as far as the practitioner is concerned, for, from a practical standpoint, the work is all that could be desired, being concise, non-theoretical, and written in a style that appeals strongly to the active practitioner; but as a text-book for the student of medicine the book is entirely too advanced. Theories in theoretical midwifery are entirely ignored. There is no descriptive anatomy of the female organs, from an obstetric standpoint, for the benefit of the student, nor is the pelvis considered as a whole. There is no mention of the mechanism of labor, and this, it must be admitted, is the essential sub-subject, the study of which fits one to be a good obstetrician. I fail to note the usual method of approaching the subject of midwifery, so admirably shown in other text-books of this kind, which gradually leads the student up to that point where he can comprehend what is meant by midwifery, and what is expected of the obstetrician.

The book is divided into sections, the first relating to Pregnancy and Labor, the second to the Pathology of Labor, the third to Obstetrical Operations, and the other four to Abortion, Extra-uterine Pregnancy and the Puerperal State, the Infant in Health and Disease, and the Jurisprudence of Obstetrics. The first section treats of pregnancy and labor in a masterly way, and when it has been read there can be no doubt of what the author wishes to impress upon the mind of his reader. Objection can be taken only to that part relating to the differential diagnosis of albuminuria and the toxemia of pregnancy. This difference is well nigh impossible to distinguish, and if it were, is of no practical importance, since the prophylaxis and treatment, both medical and surgical, are the same in both. Then the Walcher position is incorrectly described, it being one of extreme extension, the hips at the edge of the bed or table, and the lower extremities hanging free, and not, as the author describes it, "the thighs extended and allowed to fall downward, resting either on the floor or on a couple of chairs."

The next section comprises an exceptionally complete treatise on the subject of pathology and labor, and includes an excellent description of pelvic deformities, and of the methods of pelvimetry. Stress is laid upon the fact that too much reliance should not be placed upon the pelvimetric measurements in deciding upon the period of inducing labor; it is more wise to rely upon the adaptability of the fetal head to the pelvic inlet, and if, by suprapubic pressure engagement fails to occur in cases of relative or absolute pelvic contraction, he deems it expedient to bring about delivery. The subject of accidental hemorrhage is exhaustively treated here, as well as elsewhere in the book.

The chapter on Forceps is the best in the book, and follows the most recent teaching. Axis-traction in appropriate cases is generally advised, but not by the ordinary axis-traction instruments, the more complicated adjustment of tapes, through fenestræ of the blades, being preferred. The illustrations accompanying this chapter are remarkably good, the photographs having evidently been taken at the bedside. The plate showing the application of the forceps high up in the pelvis, however, is not to be commended, as it shows the forceps guided by two fingers only, whereas the whole hand should be introduced into the vagina. There is no reason why ether should be recommended in forceps operations, and chloroform in versions. A typographical error appears on page 330; "cervix" should read "vertex."

The chapters on Version, Symphysiotomy, and Celiohysterectomy are admirable, and must be read in order to be appreciated.

Abortion, Extra-uterine Pregnancy, and the Puerperal State comprise the next section. It is a mistake to introduce a description of gynecological operations in a book on midwifery, for, though dependent upon obstetrics, they are fully treated of in works devoted to this branch. It is questionable, too, if the chapters devoted to the Infant in Health and Disease were wisely added. The duties of the *accoucheur* proper cease when the puerperal period ends, and this subject rightly belongs to a treatise on the diseases of children, rather than to one on obstetrics.

It is a surprise and gratification, however, to read the section devoted to the Jurisprudence of Obstetrics, and the author has shown excellent judgment in including it in his book. This branch has been greatly neglected by other writers, and he is to be congratulated upon having brought his labors to a close in such a masterful fashion.

Whatever unfavorable criticism is made of Dr. Davis' book in this instance is completely overshadowed by the genuine worth of his effort to give to the medical profession a thoroughly scientific and brilliant treatise on obstetrics. No one is infallible, and, even though the author were, the reviewer cannot always agree with his expressed views.

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MEDICAL NEWS.

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Contents.

HOW TO TREAT A COUGH.

In an able article under the above heading in the *New York Medical Journal*, Edwin Geer, M.D., Physician in Charge of the City Hospital Dispensary; also Physician in Chief, Outdoor Department, Maryland Maternité Hospital, Baltimore, writes:

"The object of this brief paper is not to try to teach my colleagues how to treat a cough, but simply to state how I do it, what good results I get, and to call their attention to those lighter affections of the throat and chest the principal symptom of which is an annoying cough, for which alone we are often consulted. The patient may fear an approaching pneumonia, or be anxious because of a bad family history, or the cough may cause loss of sleep and detention from business. What shall we do for these coughs? It has been my custom for some time to treat each of the conditions after this general plan: If constipation is present, which is generally the case, I find that small doses of calomel and soda open the bowels freely, and if they do not, I follow them with a saline purgative; then I give the following:

℞ Antikamnia and codeine tablets, No. xxx.
Sig.: One tablet once every four hours.

"The above tablet contains four grains and three-quarters of antikamnia and a quarter of a grain of sulphate of codeine, and is given for the following reasons: The antikamnia has a marked influence over any febrile action, restores natural activity to the skin, and effectually controls any nervous element which may be in the case. The action of the codeine is equally beneficial, and in some respects enforces the action of its associate. The physiological action of codeine is known to be peculiar, in that it does not arrest secretion in the respiratory or intestinal tract, while it has marked power to control inflammation and irritation. It is not to be compared with morphine, which increases the dryness of the throat, thus often aggravating the condition, while its constipating effect is especially undesirable."

NEUROSES OF THE LARYNX.

In a "Note on Codeine" in the *Lancet*, Dr. James Braithwaite of Leeds says: "Codeine seems to have a special action upon the nerves of the larynx; hence it relieves a tickling cough better than any ordinary form of opium. One-half of a grain may be given half an hour before bedtime. It was in my own case that I first began to use codeine. For more than twenty years, usually once every winter, I have been seized with a spasmodic cough just before going to sleep, which becomes so severe that I am compelled to get up and sit by the fire. After an hour or two I return to bed and am free from the cough till the next winter. In other respects I enjoy good health. Many years ago I found that one-half grain of codeine, taken about two hours before bedtime, absolutely stops the attack and leaves no unpleasant effect the next morning. In cases of vomiting from almost any cause, one-quarter grain doses of codeine usually answer exceedingly well. In the milder forms of diarrhœa one-half to one grain of the drug usually answers most satisfactorily, and there are no unpleasant after-effects."

We find, however, that where there is great pain, the analgesic effect of codeine may not be sufficient, and a combination with antikamnia is required. It is best given in the form of a tablet, the proportions being 4¾ grains antikamnia and ¼ grain codeine. Sometimes chronic neuroses may be cured by breaking the continuity of the pain, for which purpose we have found this combination peculiarly suited.

Clinical reports in great numbers are being received from many sections of this country, which, while verifying Dr. Braithwaite's observations as to the value of codeine, place even a more exalted value upon the advisability of always combining it with antikamnia in treatment of any neuroses of the larynx, coughs, bronchial affections, excessive vomiting, milder forms of diarrhœa, as well as chronic neuroses; the therapeutical value of both being enhanced by combination. The tablets of "Antikamnia and Codeine," containing 4¾ grains antikamnia and ¼ grain codeine, meet the indications almost universally.—*The Laryngoscope*.

TREATMENT OF TUBERCULOSIS.

THE history of modern therapeutics shows a tendency among medical men to oscillate between extremes, like the pendulum, until finally the mean, or practical "point of rest" is reached.

This tendency is particularly noticeable in the treatment of the tubercular diseases. On the one hand we have had the "Gavage" or over-eating system, in which the patient is compelled to endure passive stuffing and absolute rest, in order to combat the so-called "waste of tissue" of the disease.

The fallacy of that theory having been demonstrated by its continued failure in actual practice, we seem to have swung to the opposite extreme of considering the patient as an indifferent receptacle of disease germs, into which it is sufficient to simply inject the appropriate germicide to effect a cure. So we have the various lymphs, antiseptic fluids, and other purely germicidal methods of treatment. But the results are showing that the *patient* refuses to be ignored as a factor in the case. The dead germs and the dead patient are buried together.

We see that the principle is as sound in medicine as it is in philanthropy, that the true help is that which enables the person to help himself. This is the principle upon which the treatment with the hypophosphites of lime and soda is based.

Each individual patient is composed of a collection of cells possessing vital powers. In tuberculosis these vital powers of the cells, and hence of the patient, are weakened. But by administering this remedy judiciously we gradually restore the cells again to their normal condition, enabling them to battle successfully with the invading bacilli, and to repair gradually the damage done to the tissue structures. Thus the organism acquires additional strength with each step in advance, and the cure is finally complete.

Many, no doubt, have at some time in their experience touched upon the hypophosphites. They have given them in oil, in malt extract, in some acid mixture, or in a compound with a half a dozen "tonics" added to it, and have been disappointed. The illustrious founder of this successful mode of treatment, Dr. Churchill, did not recommend any such heterogeneous mixtures of foreign substances, and his remedy should not be held responsible for the consequent failures. He simply urged that the chemically pure hypophosphites of lime and soda should be administered with judgment, perseveringly, until a permanent cure resulted. Pharmacists, ambitious of getting up rival preparations, have made the attempted improvements. It is needless to say that wherever these innovations have been adopted, failure has resulted, and the entire treatment has been brought into disrepute and abandoned.

With the pure hypophosphites of lime and soda you can score success time and again. The results are gradual, steady and certain if the remedy is persevered with faithfully, until the cure is complete. None but chemicals of known genuineness and absolute purity should be used. McArthur's Syrup is prepared on the principle laid down by Dr. Churchill. It contains the chemically pure hypophosphites of lime and soda, uncomplicated with other drugs, in a pure and wholesome syrup. If you would like to study this subject more closely the McArthur Hypophosphite Co., Boston, Mass., will send you, free, sample and literature.

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DR. WM. A. HAMMOND, *Washington, D. C.:* "In all cases of nervous diseases under my charge in which there is an excess of Uric Acid in the blood, I use the BUFFALO LITHIA WATER, Spring No. 2, in large quantities. By this I do not mean that I have the patient drink merely a tumbler or two in the course of the day, but that I flood him, so to speak, with the water, making him drink a gallon or even more in the twenty-four hours."

JAMES L. CABELL, M.D., A.M., LL.D., *Professor of Physiology and Surgery in the Medical Department of the University of Virginia and President of the National Board of Health:* "I have recently read with interest a paper in the *New York Medical Journal* on the 'BUFFALO LITHIA WATER in diseases of the Nervous System,' in which the writer, Dr. Boyland, citing his own observations and those of other eminent physicians, ascribes to this Water a special virtue as a direct tonic for the nervous system in cases of Cerebral Exhaustion. I have only had occasion to test its effects in this direction in cases in which the Nervous Symptoms may have been due to a Lithæmic condition, for which it is a well-known therapeutic resource. In these cases the relief following the use of this remedy was very decided."

DR. CHARLES G. HILL, *Professor of Nervous and Mental Diseases in the Baltimore Medical College, etc.:* "BUFFALO LITHIA WATER is my favorite of all alkaline mineral waters, and I always order it when I am anxious to get decided results. In * * * many forms of nervous dyspepsia, accompanying an excess of urates and phosphates, it is invaluable."

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